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CHAPTERS IN THE ARCHEOLOGY OF CAPE COD, I

Results of the Cape Cod National Seashore Archeological Survey 1979 - 1981

Volume 1

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Cultural Resources Management Study No. 8

Division of Cultural Resources
North Atlantic Regional Office
National Park Service
U. S. Department of the Interior

1984

FEDERAL
PUBLICATION

Cover Illustration: 19BN323, looking from the west at 323.21, .22, and .23 and Nauset Marsh in the distance (see Chapter 3).

Chapters in the Archeology of Cape Cod, I

Results of the Cape Cod National Seashore Archeological Survey 1979 - 1981

Volume 1

Cultural Resources Management Study No. 8

Francis P. McManamon, Editor

with contributions by

Christopher L. Borstel, Susan A. Chase, S. Terry Childs,

Joyce Fitzgerald, Mary E. Hancock, and Linda A. Towle

Division of Cultural Resources
North Atlantic Regional Office
National Park Service
U.S. Department of the Interior
Boston, MA 1984

EDITOR'S FOREWORD AND ACKNOWLEDGEMENTS

The Cape Cod National Seashore Archeological Survey is part of the National Park Service's effort to care for cultural resources within park areas. Funding for the project is through the Service's Cultural Resources Preservation Program.

Begun in 1979, the project is scheduled to conclude in September 1985 with final management and scientific reports to be published in 1985. To date, the survey results and interpretations have been disseminated through several published articles, numerous professional papers, and a multiude of public presentations. This report on the work from 1979-1981 is a vehicle for the detailed presentation of some of the survey data and an opportunity for survey staff and researchers working with the data to summarize and synthesize their work to date. The aim is to provide readers with current interpretations of the analyzed data as well as at least a portion of the data themselves. The report summarizes the current state of the research effort and has helped those of us working on the project to organize further analysis. We hope to provoke responses, either from others or among ourselves, that will improve our future work on these and other data from the survey, as well as providing methods, techniques, interpretations, and data that might provoke improvements for others in their work.

The successful competion of this report required the support and hard work of many individuals. This entire survey effort would have stalled long ago without the support of the National Park Service of Associate Regional Director Charlie Clapper, Chief Anthropologist Doug Scovill and Superintendent Herb Olsen. Regional Director Herb Cables and Deputy Regional Director Steve Lewis also have been steady supporters. Their support has been crucial to the initiation and operation of the project. I am personally grateful to them for permitting my involvement with this project. I hope, as I know they do, that reports, data bases and recommendations that have resulted from the survey, as well as those that are underway or planned, will enable the Park Service to effectively manage and preserve the important archeological resources of the National Seashore.

My thanks to the authors of the chapters in this report for their hard and very good work, as well as for their patience with my editorial deliberations. Several of them have been patient also with the production of this report. The chapters by Chase, Childs, and Hancock were either completely or substantially finished over one year ago.

The production of this report benefitted from the attention of many individuals, often working with care and diligence at very tedious tasks. Eric Clingen, Alison Dwyer, Martha Pinello and George Stillson provided much of this attention and were indispensable. Eric and George prepared most of the figures. Irene Duff willingly took on a multitude of tasks surrounding report production and consistently managed them to successful conclusions.

Frankly, obtaining assistance with word-processing to produce this report has been a struggle. Success has been possible only through the diligent and careful efforts of a string of remarkable individuals: Dan Smith, Irene Duff (again!), Howard Barnum, Paul Kafka (briefly), and Dianne Moore. That these individuals retained their senses of humor and cheerful demeanors throughout this process is remarkable. They have my sincerest thanks and, I am certain, those of the other authors.

Many individuals have participated in the fieldwork, laboratory work, and analysis for this project. A list of those involved can be found in Chapter 1 (Table 1.2). All of these individuals have my sincere thanks for their efforts. Of particular importance has been the work of the supervisory archeologists and crew chiefs who were burdened with the dual responsibilities of maintaining crew morale and quality control along with their supervision, recording, and research responsibilities. During the past two years Joyce Fitzgerald as crew chief and Chris Borstel as supervisory archeologist have had to handle these tasks. Both have performed admirably. As supervisory archeologist for the survey since 1980, Chris' wide-ranging, skillful work has been particualrly beneficial to the project, to me, and to his other colleagues.

I would like to slip now from editor to author and acknowledge my debt to a number of people who helped me in the analysis and writing of the chapters of the report that I authored. All of my chapters except Chapter 1 are revised or combined versions of chapters in my doctoral dissertation. My doctoral committee and other faculty at SUNY-Binghamton including Al Dekin, Chuck Redman, Vincas Stephonaitis, Al Ammerman, John Fritz, Meg Conkey, and Dick Anderus provided advice, information, and other counsel. Al Dekin and Chuck Redman provided especially critical guidance on the design of the sampling and fieldwork strategies and Al's influence on the method of intrasite analysis is evident in Chapter 3. Al Ammerman was especially helpful in developing the background for the ecological approach taken in Chapter 5. Vin Steponaitis through a set of clear, penetrating comments on drafts of several chapters provided some direction for revisions that markedly improved these results.

As an author and researcher, I have incurred professional debts to others who have conducted research for this project. The debts to Chris Borstel, Terry Childs, Joyce Fitzgerald, and Mary Hancock for their analyses and descriptions of chronology, ceramic technology, faunal and floral remains, and shellfish seasonality, respectively, are obvious in Chapter 16. The research on past environments and geomorphology by Stephan Leatherman and Patty O'Donnell has helped all of us working on this project.

In the end there are personal debts. My greatest are to Carol Pierce for her support and tolerance, and to Adalie and Kate Pierce-McManamon for their unbridled enthusiasm for life, which sets such a delightful example.

Francis P. McManamon
Boston, Massachusetts
30 August 1984

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CHAPTER 1

Project Goals, History and Products

Francis P. McManamon

This chapter is a brief overview of the project goals and history. Included also is a discussion of the contents and uses of existing and proposed reports and other products. Although this project has extended from 1978 to the present and initially experienced substantial staff turnover, the basic goals have remained consistent. Methods, techniques, and problem orientation have been modified or developed to meet conditions that were unanticipated originally, as well as those that were known and taken into account initially.

The project has advanced our knowledge about the archeological resources of Cape Cod National Seashore manifold. Resources management and interpretation at the park have benefitted already from these results (McManamon and Borstel 1981b, 1982; Borstel 1984). The number of resources, both historic and prehistoric, their characteristics, locations, and likely locations now can be estimated with far greater reliability, as well as with a measure of objectivity, than was possible in 1978 (McManamon 1981c).

Methodological and technical innovations developed for the survey should benefit the discipline of archeology generally. Advances have been made in archeological sampling and site discovery (McManamon 1981 a,b, 1984), prehistoric ceramic analysis in the Northeast (see Chapters 13 and 14), and the study of lithic raw materials (see Chapter 15), to single out only a few of the major ones. The increase in substantive knowledge is bountiful; this report describes a portion of it. The purpose of this chapter is to describe the history of the survey. Some of the substantive, methodological and technical results are summarized or alluded to briefly, but readers are encouraged to wade into the subsequent chapters for a fuller understanding of specific results.

Goals

The general goal of the Cape Cod National Seashore Archeological Survey is the inventory and assessment of archeological resources within the Seashore in order to provide for their effective management. Effective management involves the preservation and accurate interpretation of the important archeological resources in the seashore. Both the enacting legislation and National Park Service planning for the seashore recognized the importance of archeological resources in the area as a reason for establishing the seashore (Burling 1978:6-7,10). The legislation (Public Law 87-126, Sec. 7(b)(1))requires the ". . . preservation . . . public enjoyment and understanding . . ." of significant "historic sites" and "historic and scientific features," terms that encompass historic and prehistoric archeological sites, as well as historic structures, within the seashore boundaries, as important park resources to be protected. Testimony before Congress (Subcommittee on Public Lands 1961:8), the planning documents for the seashore (e.g., National Park Service [NPS] 1970), correspondence between then Regional Archeologist John Cotter and Frederick Johnson and Douglas Byers, prominent archeologists knowledgable about the prehistory of the Cape, (on file Division of Cultural Resources, North Atlantic Regional Office, NPS) and the early archeological overview done for the Service by Ross Moffett (1962) demonstrate that the importance of cultural resources, including archeological sites, was recognized. Such resources were to be considered essential ~~parts~~ part of the Cape Cod National Seachore.

Despite this information, the Park Service development of several areas in the seashore destroyed portions of potentially significant archeological site areas. Construction of the Salt Pond Visitors' Center and the Fort Hill parking lot are obvious examples. Less apparent and probably less destructive developments were pedestrian trails in the Salt Pond-Coast Guard Beach and the Pilgrim Heights areas. In both of the latter cases the trails wind through prehistoric archeological site areas; they have increased the amount of erosion in these portions of the sites. All of these developments occurred early in the initial development of the seashore.

More recently, management at the seashore and the North Atlantic Regional Office recognized these problems and moved to solve them by improving our knowledge about the archeological resources of the seashore. The means of providing this information was to be an archeological investigation. Ultimately it would be called the "Cape Cod National Seashore Archeological Survey." Planning for it began in the mid-1970s.

The preservation and accurate interpretation of important archeological sites requires certain information about them. The locations or likely locations of specific resources must be known so that development or park operations existing or planned in these locations can be designed to avoid or minimize damage to those that are important.

The importance of resources also must be assessed so that preservation and interpretation efforts can be focused. The National Park Service Management Policies (NPS 1978a: Chapter I) describes the level of importance cultural or natural resources must have to be incorporated into the park system. The criteria for listing on the National Register of Historic Places (36 CFR 60.6) provide another guide for assessing the importance, or potential importance, of specific cultural resource. Both sets of guidelines describe the major importance of archeological resources as the known or potential information they contain. Their information content depends upon a variety of factors including location, frequency, condition, contents, and structure.

It was clear from the beginning of the planning for the survey that to provide information for effective and appropriate archeological resource management in the National Seashore an investigation would have to:

(1) through fieldwork completely inventory or sample the existing resources
(2) examine their context, contents and structure, and
(3) through laboratory qualitative and quantitative analysis, assess the extent to which they inform or have the potential to inform about the past.

A comprehensive inventory and examination of archeological sites was impossible because of the unobtrusiveness of the remains and the density of ground cover below which the remains lay hidden. The effort to simply discover, let alone examine, assess, and interpret, all archeological remains within the seashore was far beyond the time and money that could be allocated to any investigation. These constraints required that the inventory actually be a sample of the total archeological remains in the seashore. In order to obtain as much information as possible about the total population of remains from the sample that actually was investigated, a probability sampling technique was incorporated into the inventory effort. A probabililty sampling design allowed a variety of estimates with quantifiable levels of reliability to be made about the totality of remains from the sample actually studied. Preliminary analysis of the early inventory results (McManamon 1981a, b, c, 1982) and the problems of discovering remains (McManamon 1984) have been presented in several articles and papers.

The examination of archeological sites once they had been discovered proceeded in several stages that are described in more detail in Chapter 2. The activities involved in these various stages of site examination have consumed the bulk of the project field time. Initial examination immediately following discovery consisted of a systematic grid of shovel tests. If remains were abundant or otherwise interesting, 50 x 50 cm or 100 x 100 cm excavation units were placed in the area of the remains. Some units were placed judgmentally, others using a probability technique. A final stage of examination, not applied in all areas, involved additional excavation units and in a few instances, additional systematic grids of short-interval shovel tests. Each of these stages was preceded and succeeded by analysis, the results of which were used to decide upon whether to proceed with subsequent examination and if so, the nature of it. Many aspects of this part of the survey activities have been described and discussed in papers and reports (Borstel 1981, 1983; Borstel and McManamon 1981; McManamon and Borstel 1981a, 1981b).

The fieldwork conducted from September to November of 1983, the last field season for the survey, involved the most intensive examination of the project. Two relatively large block or "checkerboard" excavations were employed to explore the structure of sites at Fort Hill in Eastham and High Head in North Truro. Reports describing and analyzing these excavations are now being written.

The third crucial aspect of the investigation listed above, the data analysis to determine their information content or potential, has been the most long-lived and continuous. The analysis of data began in 1978, well before any fieldwork, with the inspection of prehistoric collections gathered years ago from the outer Cape, particularly those of Ross Moffett and Howard Torrey which are curated at the R. S. Peabody Foundation for Archaeology, Phillips Academy, Andover, Massachusetts. The statewide archeological inventory, compiled and maintained by the Massachusetts Historical Commission, also was inspected and used to construct the initial sample design. Data analysis has continued since then in an effort to have fieldwork decisions informed as much as possible by analysis of data generated by earlier fieldwork. Analysis has been particularly intensive since the initiation of site examination activities during the 1980 field season. Chapter 2 will describe some of the methodological aspects of the analysis and the subsequent chapters will present technical and substantive issues, interpretations, and data.

Project History

In 1976 the National Park Service began planning for a study of the history and archeology of the area encompassed by Cape Cod National Seashore. As described in 1976 (NPS 1976), the study was to identify and evaluate historic resources in the seashore. An archeological survey was to be a part of this study. Its main goal was to review, update, and evaluate the archeological information then available for the Seashore (Moffett 1962).

Late in 1977 a more detailed scope of work for the archeological portion of the project was prepared (NPS 1978b). In fiscal year 1979 (October 1978-September 1979) the archeological survey was funded and implemented by the Division of Cultural Resources, North Atlantic Regional Office, with the author as principal investigator. The historical research portion of the original combined study was done by Berle Clemensen, a historian at the Denver Service Center, National Park Service. Clemensen's research and writing were completed prior to the archeological work (Clemensen 1979); therefore, although the archeological research was informed by Clemensen's completed work, no direct coordination was possible between his research efforts and the survey.

The archeological investigation had six components enumerated in the detailed scope of work (NPS 1978b):

(1) an evaluation of the extent of archeological knowledge and base map (i.e., Moffett 1962),
(2) an evaluation of the existing known sites,
(3) analysis of the past natural environment to provide information about the past environmental contexts of human cultural adaptation,
(4) multi-stage documentary and field investigations to identify and assess a representative sample of the archeological resources,
(5) laboratory analysis of the recovered materials, and

(6) a report of the investigations.

During the five years that the survey has run, each of these components has been addressed. Two of them have been completed; the others are under way and will be completed by the conclusion of the project. The status of each of these aspects of the survey will be discussed in the following sections.

Before proceeding with these descriptions, however, it is necessary to explain the emphasis upon prehistoric archeology that developed as this investigation progressed. The original intent of the investigation was to provide equal attention to both historic and prehistoric sites. During the initial phase of the investigation, the site survey, discovery, and initial site examination, equal treatment was possible, and sites from each period were treated identically. Thus, a large data base on historic period sites within the study area exists. Preliminary analysis suggests that at least some of these remains are important and that significant research questions can be examined using these data (McManamon 1981c; McManamon and Childs 1981).

Considering the money and time available, however, it was impossible to give equal attention to historic sites, complete the survey within the timeframe established after the 1980 season, and derive sufficiently detailed data for effective management and interpretation. Given these constraints, the decision to concentrate on prehistoric sites has four justifications:

(1) Less is known about prehistory and there is no source of information besides the archeological record.
(2) The expertise of the principal investigator and the staff was mainly in prehistory.
(3) More comparative archeological data was available to assess and interpret prehistoric remains.
(4) A large body of documentary sources would have had to be scrutinized prior to intensive site examination of the historic sites.

Some of the products of the survey have or will describe and analyze historic period archeological resources, but not in the detail or to the extent that prehistoric resources are considered.

The following sections will describe briefly the work that has been accomplished so far on the six components of the investigation as they were listed above.

The Evaluation of Existing Data and Known Sites

The first two components involving the evaluation of existing information were completed in 1978 and 1979 prior to initiating fieldwork. The objectives of these two components were:

(1) to identify the locations of known and reported sites
(2) to become familiar with the expectable types of artifacts and stratigraphy and prepare a cataloguing system and recording forms for them
(3) to obtain background information about the existing interpretations of prehistory and history in order to frame hypotheses for investigating substantive issues.

The statewide archeological site inventory maintained by the Massachusetts Historical Commission constituted the known and recorded archeological record of the outer Cape. These data were recorded on a series of maps and used to design the survey sampling strategy as well as for background checks to determine the resources that survey crews could expect when testing specific sample units.

The most detailed information on specific prehistoric archeological sites on the outer Cape is available in the Ross Moffett collection maintained by the R. S. Peabody Foundation for Archaeology, Phillips Academy, Andover, Massachusetts. The Moffett collection contains not only large numbers of artifacts from sites that he excavated or collected, but detailed notes, profile drawing, excavation unit plans and even occasional site maps. These artifact collections and notebooks are a true gold mine of archeological data awaiting, and amenable to, much fuller analysis than has been possible as part of this project. They were used to develop the lithic artifact catalog system and to provide background on expectable artifact types, raw materials and vertical soil stratigraphy. All of the prehistoric artifacts at the R. S. Peabody Foundation subsequently have been included in the Massachusetts Historical Commission statewide archeological collections inventory (MHC 1981). Some of the Commission inventory data is referred to in the chronology chapter of this report (see Chapter 8).

The evaluation of existing information on historic period archeology had to be handled differently. Neither the Massachusetts Historical Commission archeological site inventory nor the Moffett collection contains, or makes any pretense of containing, systematic data on historical period archeological remains. Furthermore, Clemensen's (1979) historic resource study concentrates upon a few specific, spatially limited historic period resources and topics. Therefore, a special documentary study of the history of the outer Cape with particular emphasis on potential historic remains was done (Rockmore 1979). The study aimed not only to provide a general background of the history, but also to identify specific or general locations where known or likely historic period sites would occur. This information was used to inform field crews of the likelihood of encountering historic period remains in sample units they tested.

The initial review of interpretations of the prehistory and history of the outer Cape and southern New England in general led to the identification of several hypotheses to be tested. These are recorded in a research design written initially for the survey (McManamon 1979). As interpretations and specific research questions often are, these have been modified as data collection and analysis has proceeded. In this report, current interpretations about prehistory are summarized in Chapter 5 with a discussion of how the analysis presented in this report reflects upon them in Chapter 16.

Analysis of Past Natural Environments

A variety of reports, two of them done specifically for the survey, are available to describe the past natural environment. What is required now is a detailed synthesis of information. Data have been compiled recently on geomorphology (Leatherman 1979, 1981; O'Donnell and Leatherman 1980) and vegetation (Winkler 1982). Along with this, to complete the study, a detailed analysis of the availability and abundance of natural resources that were important to prehistoric and historic outer Cape inhabitants is needed. Chapter 4 of this report aims to make a move towards a detailed synthesis but is acknowledged explicitly not to constitute one.

Multistage Field and Laboratory Work

Fieldwork for the survey was conducted in all years since 1979. It can be divided into four stages which are described more fully in Chapter 2: (1) field survey and initial site examination, (2) probability site examination, (3) systematic and judgmental site examination, and (4) excavation. Excavation occurred as part of the survey only in September-November 1983.

The areas and sites where these different stages were conducted during different field seasons is shown on Table 1.1. This report uses data collected during all field seasons through 1982; the 1982 data were incompletely processed, however, and are not completely available for interpretation. What follows is a summary of the main activities undertaken during each calendar year of work on the survey. A list of the individuals who have been involved directly in the work and their positions is provided on Table 1.2.

The first year of fieldwork (June-September 1979) was devoted to drawing a probability sample of units from within the study area. The sample design, strategy, and techniques are described in Chapter 2 and in McManamon (1981a and b). The sample design was multistage with the first stage being a pilot sample of 1% of the study area. Analysis of the pilot sample resulted in the delineation of four sample strata: IA, IB, IC, and II. During the remainder of the 1979 field season additional sample units were tested in all strata with effort concentrated in Strata IA and IB, where the prehistoric archeological remains and their spatial distribution seemed most abundant and diverse.

In September one week was spent excavating what turned out to be a very important prehistoric burial. The burial location was outside the study area but was threatened with destruction due to development. The justification for using survey personnel and funds to salvage the threatened data was that if a similar kind of burial was found in the survey, it would not necessarily have to be excavated. The excavation of the burial showed it to be an ossuary, a type of prehistoric interment previously unknown in New England (Bradley, et al. 1982).

Data analysis between October 1979 and May 1980 concentrated on the intrasite distributions of artifacts, mainly lithic tools and debris, shellfish and other midden remains and fire-cracked rock. The laboratory analysis was used to delimit spatial units of analysis for which the contents and structural characteristics could be compared. These units were typically portions of site areas where remains were relatively concentrated. In some cases two or more site areas were combined when it became clear on the distribution maps that no significant decrease in the

Table 1.1

Summary of Field Work Activities by Year

Year	Field Survey and Initial Site Examination	Probability Site Examination	Systematic and Judgmental Site Examination
1979 (June - September)	-Pilot sample -Stratum IA sample	-	-
1980 (June - November)	-Stratum IC sample	19BN308 273/275,274/339, 340,341,288,281, 353	19Bn374[a]
1981 (June- November)	-High Head sample		19BN308,323 274/339,341, 288
1982 (September- November)	-Stratum IB sample -High Head sample -Informant sample		19BN374,[a] 415/481 471

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[a] Fieldwork done for the Nauset Light and Coast Guard Beach development archeological impact study and Coast Guard Beach data collection program.

density of remains occurred between the sites that had been identified separately in the field. This analytical process and its results are described n Chapter 3 and in McManamon (1982).

The second field season began in June 1980 with two main objectives: (1) probability site examination of a number of site areas and (2) completion of the sampling of Stratum IC. The latter was accomplished smoothly, if uneventfully; the former resulted in the development of intrasite examination method, as well as two important shifts in project funding and duration.

Intrasite sampling for the probability site examination involved a stratified, nonaligned, random technique for selecting excavation units. Site areas were gridded into 10 x 10 m quadrats and one excavation unit selected randomly from each. Excavation units were 50 x 50 cm or 1 x 1 m.

Initially, a substantial amount of time was spent examining 19BN281 which proved to cover a very large area in High Head, North Truro. The examination at 19BN281 showed that for large site areas the sampling approach initially chosen was too time consuming. It was modified so that the sequence of quadrats from which excavation units were selected moved outward from the portion of site areas that seemed to have the densest remains. This permitted the commitment of a block of time to each site area for the examination of the densest remains. The examination at 19BN281, on the other hand, had involved the completion of all units selected within the site area regardless of projected density of the remains.

Another point driven home by the 19 BN 281 examination was the need for a greater level of yearly funding for the survey. The original (1977) estimates had been for a three-year project at $40,000 per year. During the 1980 field season, however, only 8 of the 45 prehistoric site areas identified by the analysis of the 1979 data (McManamon 1982) were examined, along with one historic period site. Furthermore, the testing that was done--a 50 x 50 cm or 1 x 1 m square in each 100 square meters--was very limited.

Time estimates for site examination and laboratory work during 1979 and 1980 and the number of sites at which examination was needed pointed to the necessity of increasing both project yearly funding and duration. The project length was extended through fiscal year 1984, with yearly funding boosted to the $100,000-120,000 level, about 90% of which was for personnel salaries and benefits. This project was subsequently extended by one year so that

Table 1.2

Cape Cod National Seashore Archeological Survey
Personnel 1978-1983

1978-1979

Supervisory Archeologist: E. Filios
Crew Chiefs: J. Bradley, S. T. Childs, D. Lacy
Archeological Aides: H. Delano, D. Gagnon, E. Ham, A. Harlow, J. Kerber, S. Loquidice, D. Milanskas, D. Tillar, J. Tuma

1980

Supervisory Archeologists: R. Moir, C. Borstel
Crew Chiefs: C. Borstel, S. T. Childs, H. Delano, E. Filios
Archeological Aides: D. Butler, T. Chase, F. Dunford, D. Gagnon, A. Harlow, S. Loquidice, M. Reinke, D. Schindler, S. Spano

1981

Supervisory Archeologist: C. Borstel
Crew Chiefs: S. T. Childs, J. Fitzgerald, M. Hancock
Archeological Aides: S. Chase, E. Clingen, F. Dunford, D. Gagnon, L. Gallant, S. Loquidice, J. Mullen, C. Ravenhorst, J. Ravenhorst, P. Rolnick, S. Spano, G. Stillson, B. Willard

1982

Supervisory Archeologist: C. Borstel
Crew Chiefs: J. Fitzgerald, S. Chase, G. Stillson
Archeological Aides: J.Alexandrowicz, S.Alexandrowicz E. Clingen, A. Dwyer, T. Koenig, D. Kopec, J. Mullen, S. O'Connell, M. Pinello, C. Ravenhorst, J. Ravenhorst
Research Projects by: S. T. Childs, M. Hancock, P. Rubertone

1983

Supervisory Archeologist: C. Borstel
Crew Chief: J. Fitzgerald
Archeological Technicians: S. Chase, M. Pinello, G. Stillson
Archeological Aides: J. Butler, E. Clingen, A. Dwyer, F. Markham, J. Mullen, M. Oldale, S. Spano
Research Projects by: S. T. Childs, M. Hancock, P. Rubertone

excavations could be conducted and the results analyzed for two very important sites (Table 1.3).

In the fall of 1980 an archeological study of the proposed impact areas for developments in the Nauset Light and Coast Guard Beach areas of the seashore was begun in association with the survey. The developments planned there were replacements for facilities destroyed by the tremendous winter storm of February 1978 and continuing coastal erosion. Funding for the archeological work came from the Park Service Development Program, not the survey project. The survey and impact study are complementary and the distinction between them has been maintained in project execution. Fieldwork during the fall of 1980 included impact area survey and site examination (McManamon and Borstel 1981b).

Artifact and sample washing, processing, cataloging and analysis were done continuously from the beginning of the 1979 field season through the end of the 1980 season, although with varying intensity. The 1980 secondary site examination included the recovery of much larger amounts of artifacts, faunal and floral remains, fire-cracked rock, etc., than the survey and initial site examination. Consequently, the laboratory work from December 1980 through May 1981 largely involved artifact cataloging. Analysis during this period concentrated on describing and assessing the significance of the remains discovered and examined in the impact area study (McManamon and Borstel 1981b). This analysis was also useful for testing analytical techniques suitable for site examination data from the survey. The focus on this description and analysis, furthermore, was required to seek a determination of eligibility for the National Register of Historic Places for some of the remains within the impact areas.

The objectives of fieldwork in 1981 were: (1) to continue site examination in prehistoric sites in the Nauset Bay area, (2) to intensify examination in parts of sites with the densest remains in order to discover subplowzone features, and (3) to test a restratification of the sample strata in the High Head area.

The 1979 and 1980 survey work indicated that prehistoric remains within the seashore boundaries were concentrated along the shore of Nauset Marsh. Some of these sites had been examined in 1980; however more examination seemed necessary, as was examination of other site areas not tested in 1980. The 1980 site examination results were disappointing in that little organic material was recovered in contexts suitable for C-14 dating, nor were artifacts

Table 1.3

Yearly Funding Level, Cape Cod National Seashore Archeological Survey

FY	Dollars (in thousands)
1979	46
1980	59
1981	100
1982	100
1983	120
1984	115
1985 (projected)	40 (report production and report publication only)

that could be dated typologically recovered in abundance. The structure of site areas and distribution of features within site areas were not clear from the 1980 site examination data.

Upon reflection, it is obvious that such information would be difficult to derive from widely spaced and small area examination units in any archeological situation. In the Nauset area, the difficulty was compounded by the seemingly boundless, spatially extensive archeological remains and the pervasiveness of historic period plowing which had mixed all archeological remains within roughly 30 centimeters of the surface. In an attempt to overcome these obstacles a more intensive, albeit less spatially extensive, site examination method was devised. The exact application varied according to site area, extent of 1980 testing, and the remains recovered. The basic method was to obtain data on spatial variation in the density of remains through systematic grids of shovel tests at relatively close intervals (5-15 m); then, in areas of densest remains, using total lithic artifacts/shovel test and grams of shell/shovel test, to place 1 x 1 m or slightly larger excavation units.

A checkerboard arrangement of excavation units, that is with units touching at their corners, for the intensive testing was used initially to promote the discovery of subsurface or sub-plowzone features. This arrangement allowed excavation units to be located together, but kept their maximum amount of edge available to intercept sub-surface features at their boundaries.

The analysis of the 1979 and 1980 sample unit data suggested that in the High Head area the differentiation of Strata IA and II might be incorrect (McManamon 1982:18). To examine this possibility a sample frame composed of 87 100 x 200 m sample units was imposed upon this area and a random sample chosen. Eight of the sample units were tested late during the fall of 1981; the remainder were tested in the 1982 field season.

Also, late in the 1981 field season a prehistoric site, 19BN410, in the active sand dune fields of the Provincelands was tested. The site, which contained an area of shell midden surrounded by a wide scatter of lithic artifacts, was on the surface in a blowout area.

During the fall and winter of 1981-1982 the method and techniques for delimiting units of analysis, called "concentrations," within the site areas were tested and developed. The method and techniques are described in Chapter 2; the geographical and spatial relationships among site areas and concentrations are described in Chapter 3. Data organization and analysis to make the delimitations for sites examined in 1980 and 1981 were completed during this period. Also begun in earnest at this time was the sorting of materials recovered from the flotation of soil samples, typically samples from features or middens. Special studies of shellfish remains for season of death analysis (Hancock 1981, and Chapter 12), prehistoric ceramics (Childs 1981 and Chapters 13 and 14), faunal and floral remains (Chapter 10), and lithic raw materieals (Chapter 15) also were begun.

Fieldwork in 1982 had two objectives. One was the first stage of data collection for 19BN374, a site determined eligible for the National Register that will be impacted by the planned Coast Guard Beach roadway project (Borstel 1984). The other objective was the completion of all remaining sample units for the survey. Units remaining to be tested in Stratum IB and the newly defined High Head stratum were completed.

One additional piece of sampling and site discovery remained. The sampling done from 1979 through 1981 indicated that sizable prehistoric sites either did not exist or were very rare in the study area between High Head and Nauset (e.g., McManamon 1982:18-19). If the former, no amount or intensity of testing would discover them; if the latter, however, a probability sampling technique would be very unlikely to find them. Therefore, an additional approach was attempted by contacting and interviewing artifact collectors (Borstel 1982). Though only partially implemented, this approach netted several locations where artifacts had been seen or collected in the targeted area. One of these, 19BN471, seemed a promising candidate and was tested during 1982.

Late in the 1982 field season, intensive site examination was done at one large site area in High Head in order to collect data from this area that would be more easily comparable with data about the sites at Nauset.

Since January of 1983 data organization and analysis have focused upon the preparation of material for this and other reports. The 1982 site examination data are incompletely organized. They will not be discussed or analyzed in this report nearly to the extent of the other earlier data.

During the fall of 1983, small excavations were made at 19BN308 in the Nauset area and 19BN281 at High Head in order to better interpret the spatial structure and organization of the remains as well as test how well earlier site examination data describes these characteristics.

Reporting the Survey Results

The final products planned for the project, plus this report and earlier ones, are considered in the next section.

A Guide to This and Other Survey Products

Preliminary substantive and methodological results of the probability sample have been published in several articles (McManamon 1981a, b, c, 1982). Methodological and substantive topics based upon the more detailed site examination data have been presented, albeit in a less widespread fashion (Borstel 1981, 1984; Borstel and McManamon 1981; Childs 1982; McManamon and Borstel 1981a, b). The dissemination of information about the survey and its results to the general public has occurred through special issues of the seashore's seasonal newspaper, informational handouts distributed by survey personnel who encounter tourists or landowners, and weekly slide presentations and lectures by Christopher L. Borstel during past field seasons. Another recent product for public information is a short, low-cost booklet for sale at the seashore visitor center (McManamon and Borstel 1982).

This report, which describes, analyzes and interprets the results of investigations made between 1979 and 1982, also bears the more general title, Chapters in the Archeology of Cape Cod, for two reasons. First, these two volumes are, in fact, a collection of chapters written by a variety of authors. The chapters that present substantive descriptive and analytical information are organized similarly so that the different data sets they consider can be compared easily. Many of the chapters, nonetheless, also can be taken and used independently.

The second reason for the general title is that several more volumes presenting information from the survey are planned. These future volumes, like the two of the interim report, will contain chapters on aspects of the archeology of Cape Cod. The general title seemed an appropriate one under which to fit a series of volumes on the survey. It will link them together with subtitles differentiating their specific contents. The other volumes are being planned to include: completed description and analysis of the 1982 and

1983 work, a more complete description and analysis of the survey than is contained in the published articles, a report on the data collection for the Coast Guard Beach impact area, and possibly one or two other topics.

A separate final report for the survey also is planned. The final report will synthesize the findings of the other reports, summarizing the descriptive data and presenting the final interpretations. It is hoped that a more detailed popular version of the currently available pamphlet on the archeology of the seashore (McManamon and Borstel 1982) will be possible.

The 1979-1981 Report

Although there have been many articles, professional papers, and public presentations about the survey, this report is the first detailed presentation of a wide range of data and interpretations. In the remaining chapters of Part I, readers will find descriptions of methods and techniques used for the sample survey, site examination, and to identify the units of analysis. The geographical and spatial relationships between these units--the concentrations--and the site areas within which they occur also are described as are the physical settings of the concentrations analyzed in chapters of this report. Volume 1 also includes a summary of the natural environmental setting, the theoretical orientation for interpretation, and summaries of current ethnohistoric and prehistoric interpretations. Volume 1 concludes with analyses of stratigraphic and chronological data for the prehistoric sites.

Volume 2 of the report deals with various kinds of prehistoric remains in a series of chapters. Each chapter uses a common set and sequence of units of analysis to minimize confusion about the identity and locations of concentrations. A series of foldout maps will help with the geographic orientation as well. Most of these chapters report the results of research projects that have reached a mature, but not final, stage. To say it another way, these are not the last words on this set of data, though they should illuminate the ultimate interpretation accurately. The bulk of the data presented come from the 1979 through 1981 field seasons; however, in a few chapters, some data from 1982 and 1983 fieldwork are included.

Conclusion

Throughout this chapter the survey has been referred to in the present tense, for although the project is "winding down," it will run through September 1985. All phases of the survey have been important and the current stage of report writing and publiction is no less so, although it involves fewer individuals and no fieldwork.

Writing and dissemination of the survey results are a crucial part of the project because the main gain from the project is information--information for resource management, for interpretation, and for the improvement of archeological theory, method, and technique.

The Cape Cod National Seashore Archeological Survey is among the most thorough and intensive surveys yet conducted in northeastern North America. Over 425 hectares (428 ha. or 1048.6 acres) were field tested by 214 sample units using the discovery procedure described in Chapter 2. Roughly 200 historic and prehistoric sites were discovered and had initial examination tests done to determine their sizes, structure, and contents. Roughly 20 sites, mainly at Nauset and High Head, were examined intensively. Over twenty C-14 dates have been made for prehistoric sites; another eleven samples are being dated and more may be submitted. While this brief quantitative catalog of level of effort and accomplishment should convey a sense of the magnitude of the project's results, it is insufficient. The chapters of this and subsequent reports hold the real results of the survey. Readers and researchers are encouraged to use them vigorously.

Acknowledgments

Charlie Clapper, Joyce Fitzgerald, Carol Pierce, and Chris Borstel commented on the draft of this chapter. Superintendent Herb Olsen brought to my attention testimony before Congress during the public hearings on the creation of the Seashore. I thank all of these individuals for their time and efforts.

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CHAPTER 2

Method and Techniques for Survey and Site Examination

Francis P. McManamon

One of the main goals of the Cape Cod National Seashore Archeological survey was to use the frequencies and locations of sites and intrasite concentrations to characterize the cultural adaptations of human populations that used the area (McManamon 1979). Since all the relevant past activities that constituted these adaptations were unlikely to be represented at a single site, it was necessary to have data from a variety of sites. In a similar way, the variety of remains in all parts of site areas, rather than only from the densest deposits, was deemed important. The typical method of excavation in coastal New England archeology, indeed in most archeological investigations, has been to focus almost exclusively on the most dense deposits; however, because deposits in different parts of sites may reflect different kinds of refuse and activities, it was not the appropriate approach for this investigation. For the same reason, it was important to delimit units of analysis more precisely than "site." Subsite spatial units termed "concentrations," defined and described in Chapter 3, served this purpose.

Since comparisons of the kinds, frequencies, integration and organization of activities among different parts of the study area were considered important, both site discovery and site examination efforts involved probability sampling designs. The next section concerns sampling, the survey design, and site discovery techniques. Later sections describe the method and techniques used for site examination.

Survey and Site Discovery

The data collection for this study involved two principal stages: survey and site examination. The survey was to discover and provide estimates of the general pattern of site frequencies and locations. One goal of this stage was to estimate as precisely and objectively as possible the frequency of different types of prehistoric sites and, by inference, activities in various parts of the study area. The potential probability sampling problems of site rarity and spatial clustering (Schiffer et al. 1978:2) were avoided by careful, staged use of sample stratification. The unit of analysis for the first stage was the quadrat sample unit described below. This is not, however, another example of "non-site archeology" (Thomas 1975; Nance 1980). Sites, as defined below, were identified and their frequency within a unit of analysis regarded as a variable of the unit. Summary statistics (i.e., the sample mean and its standard error) then were used to describe the relative frequency of occurrence of sites, or sites with different characteristics, per sample unit. These in turn served to derive inferences about the types and frequencies of prehistoric activities and their general spatial distribution in the study area (McManamon 1981a, b, c, 1982).

Survey Field Strategy

About 18,000 hectares (44,600 acres) are encompassed by the boundary of Cape Cod National Seashore where the study area is located. The area is densely vegetated. A substantial percentage of the area is owned privately in small acreage units. In other words, the study area presented challenges similar to those surrounding site discovery, field orientation, and accessibility throughout much of Northeastern North America as well as other densely settled parts of the world. The Seashore contains marshes, heaths, cliffs, woodlands, fields, sand dunes, tidal flats, submerged land, ponds and streams. About 6,900 of these hectares (17,000 acres) are beneath Cape Cod Bay or the Atlantic Ocean and were not included in the survey investigation area. An additional 5,300 hectares (13,000 acres) are covered by ponds, wetlands, or thick sand dunes. These latter two kinds of areas could not be tested adequately by available survey techniques and also were excluded from the investigation area. This left approximately 5,900 hectares (14,500 acres) constituting the investigation area (Figure 2.1). This area served as the potential population for the survey sampling design.

From the initial planning for the survey, it was clear that intensive field investigation of the entire project area was not feasible. It was impossible to investigate even half or a third of the area in enough detail to locate, examine, and interpret all of the archeological resources. Soil and vegetation covering the resources require the expenditure of a large amount of labor for site discovery, examination and data collection. Available funds were sufficient for intensive field work in a small fraction of the entire study area only. Therefore, it was clear that interpretation would have to rely upon a sample of the population of archeological sites within the study area. This is a common situation in archeological investigations and not a

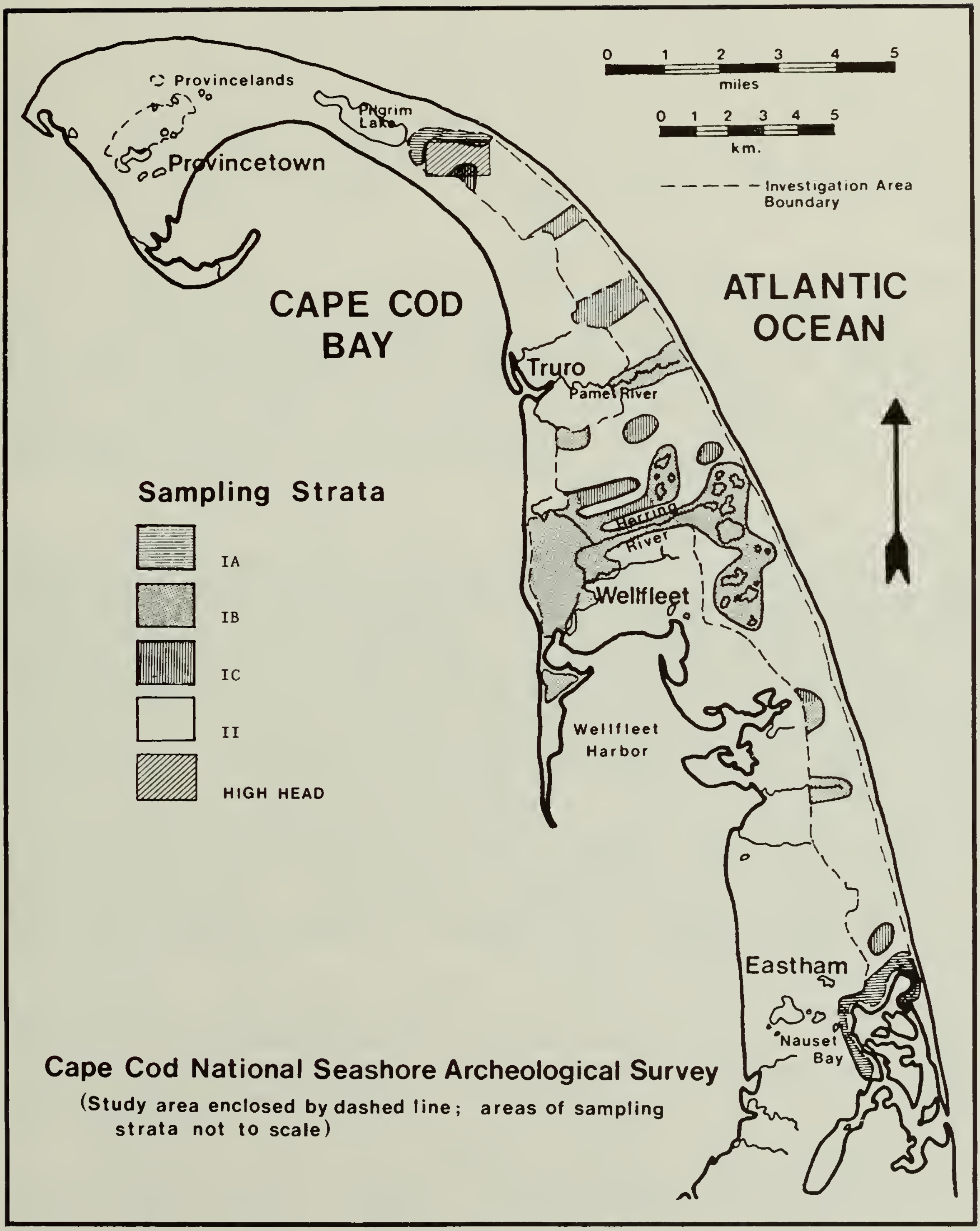
Provincelands
Provincetown
Pilgrim Lake
0 1 2 3 4 5
miles
0 1 2 3 4 5
km.
Investigation Area Boundary
CAPE COD BAY
ATLANTIC OCEAN
Truro
Pamet River
Sampling Strata
IA
IB
IC
II
HIGH HEAD
Herring River
Wellfleet
Wellfleet Harbor
Eastham
Nauset Bay
Cape Cod National Seashore Archeological Survey
(Study area enclosed by dashed line; areas of sampling strata not to scale)

Figure 2.1

completely negative one. Being forced to study samples of the archeological record can push archeologists to squeeze as much inference as is legitimately possible out of the smallest amount of data. These constraints in some instances can have two positive effects: (1) more archeological data are preserved *in situ*, (2) funds expended on data collection are reduced leaving more for analysis and interpretation or other projects. When they occur, these effects may have the happy results of maximizing the amount of the archeological record that is left for the anticipated improved research designs of posterity and a greater spread of scarce funds for appropriate contemporary research.

Selection of the survey sample could have been done in a variety of ways (Plog et al. 1978; Redman 1974; Schiffer et al. 1978). Strategies involving probability-based selection and several means of judgmental selection were considered. The value of probability sampling, as already mentioned, lies in the objectivity it allows in deriving estimates and judging their reliability. For resource management and a large number of research questions such estimates, if obtainable, can be invaluable.

Since the survey stage of the investigation aimed to provide accurate estimates of the frequency and locations of sites, a sampling design that would allow estimates the precision of which could be judged quantitatively was desirable. This required a design in which selection of the sample units involved a measure of probability. Since some information about the locations of archeological sites in the investigation area was available, a stratified random design was chosen. Stratification was based upon the known record and environmental variables as recommended by Judge et al. (1975:121-2). Properly stratified samples yield more precise estimates than unstratified samples and often are preferred when possible (Cochran 1977:Ch. 5; Read 1975:58; Redman 1974). In addition, archeological resources in the study area were not expected to be abundant and evenly distributed, the conditions usually required for simple random sampling to be effective (Schiffer et al. 1978).

The locations of archeological resources in the vicinity of the study area that were reported in the Massachusetts Historical Commission statewide archeological inventory, the most comprehensive list of known sites in the state, were investigated to determine how the stratification should be arranged for effective sampling. The record indicated that over 80 percent of the reported prehistoric sites were located within 200 m of a fresh water source or a tidal marsh. Casjens (1979) identified a similar correlation for inventoried prehistoric sites in the Concord River valley. For the initial sampling, areas with these characteristics were lumped together as Stratum I. Areas more than 200 m from present or past sources of fresh water or tidal marshes were designated as Stratum II. Water sources and marshes were identified using 1:24000 U.S.G.S. topographic maps and a 1962 vegetation map of the Seashore at the same scale.

Sample units were 100 x 200 m (2 hectare or 4.9 acre) quadrats. This size was selected for two reasons. First, the initial stratification of the study area differentiated between areas within and areas beyond 200 m of a past or present fresh water source or tidal flat. It was essential that the sample units could cover Stratum I evenly; therefore, at least one dimension had to be 200 m. Within Stratum I, sample units were oriented with the 100 m edge along the boundary of the past or present water source or tidal area and the 200 m edge perpendicular to it running the width of the stratum in order to cover all of the area designated as Stratum I. The location of each unit was chosen using points numbered along a line that followed the edge of each water source. Numbers were selected randomly to determine at which point a sample unit would be placed. In Stratum II a grid of points was used to select randomly the location of each sample unit. These were oriented north-south along their long axes.

The second reason for the unit size was that it could be tested by a single crew in a relatively short time. Ordinarily, several units were completed by one crew in a day. Crews usually finished the same day all units they had begun, thus reducing the transportation time devoted to returning for short periods to finish partially completed units. Logistical considerations like this one are part of the practical side to any sampling design (Plog 1978; Plog et al. 1978; Redman 1974:19-20). Square quadrats 200 m on a side were not used because the smaller-sized units allowed more to be sampled and increased the sample size.

A great deal of pre-fieldwork planning was necessary to make this strategy operational. The sample units were selected and mapped on U.S.G.S. 7.5 minute topographic maps. Next they were mapped on paper copies of aerial photo mosaics (scale 1:2400) the Seashore staff uses for recording property lines and land ownership. The air photo mosaics were used for field orientation. Whenever private property was included within a sample unit, the owner′s permission to test on or cross over his land had to be obtained.

Site Discovery

Almost all of the investigation area for the survey has dense ground cover. Usually soil and vegetation make most sites there, and in many other parts of the world, invisible without subsurface testing. Therefore, it was necessary to test intensively using a subsurface technique (McManamon 1984). Each sample unit was tested by 32 shovel tests arranged systematically at a 25-meter interval (Figure 2.2). The shovel test pits were

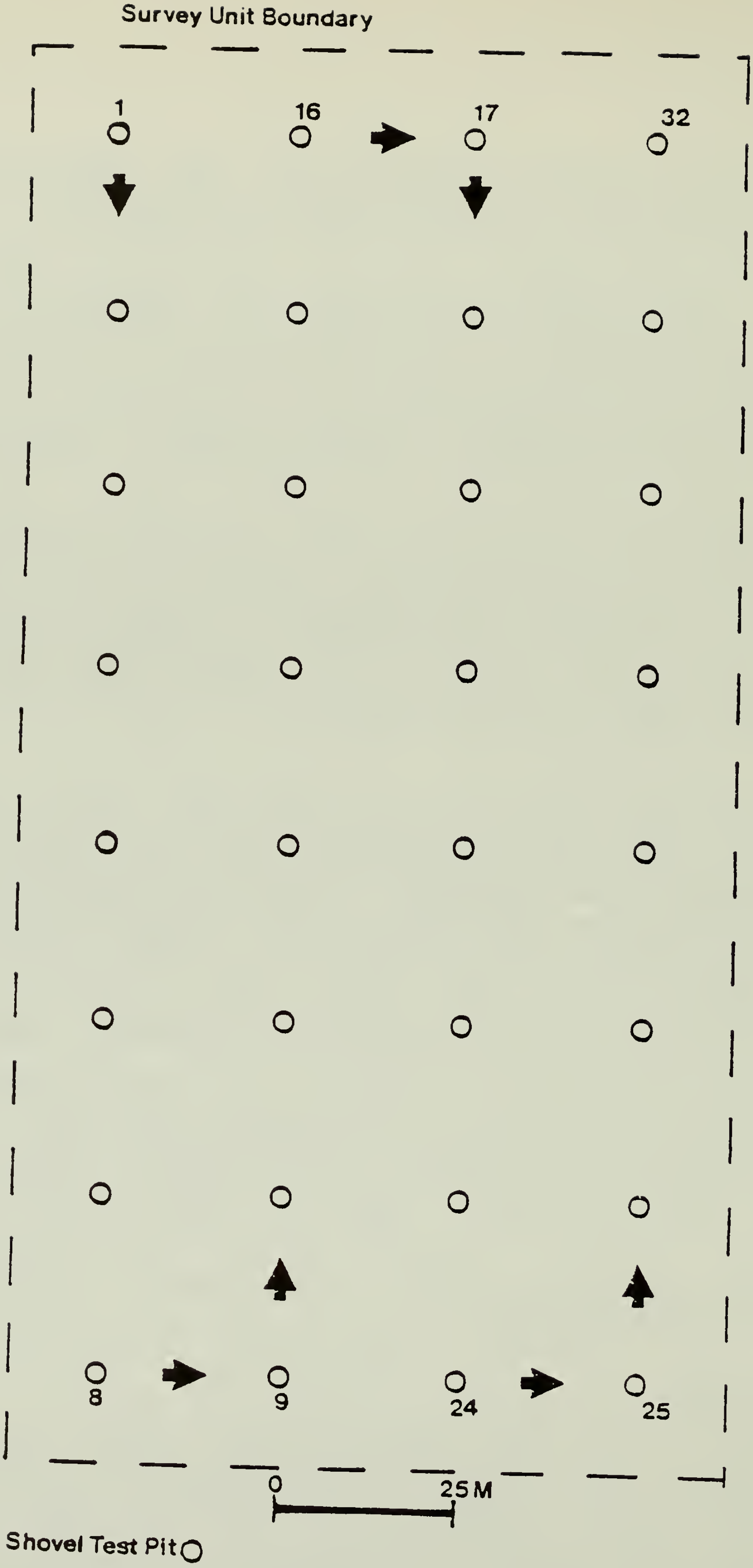
Survey Unit Boundary
1
16
17
32
8
9
24
25
0
25 M
Shovel Test Pit

FIGURE 2.2

approximately 40 cm in diameter and dug to culturally sterile glacial sand, typically less than 75 cm. Test contents were screened through .6 cm (1/4 inch) mesh hardware cloth.

Unless one discovers all the sites of interest within a sample unit, one is subsampling, not directly sampling (Nance 1979, 1980, 1983). This has a significant effect on the estimates that can be derived from the sample data. To address the potential subsampling problem in this analysis, two points must be made. First, because of the initial interval between the systematic shovel tests, it is expected that sites with areas of 625 square meters (25 x 25 m) or less are under-represented in the sample. Sites of this magnitude might fall between shovel tests easily, although some would have been discovered by the shovel tests. Therefore, the estimates of site occurrence based on the sample probably underestimate the frequency of small area sites.

The second point is that the test technique, in this case shovel tests with their contents screened, must discover sites effectively when they are excavated within a site area. The effectiveness of shovel tests was tested during the 1979 field season. Within the site areas tested, 78 percent of the shovel tests discovered artifacts. For prehistoric sites with lithic artifact densities of about 12 per quarter cubic meter, 100 percent of the tests discovered artifacts. Alternative discovery techniques: soil augers (diameter 15 cm) and soil cores (diameter 3 cm), were compared with the shovel tests for effectiveness (Table 2.1). This check of the techniques indicates that shovel tests are much more effective than these two alternative techniques. Direct sampling rather than subsampling of site occurrences (for sites greater than 625 square meters and with lithic artifact densities above 12 per quarter cubic meter) within each sample unit probably was accomplished. The test of different discovery techniques confirms the need for the inspection of relatively large volume tests in order to discover most prehistoric sites (Nance 1979, 1983; McManamon 1984).

Testing the Sample Stratification: The Pilot Sample

The use of stratified sampling techniques can improve the precision of estimates; stratification, however, poses a danger of incorrectly affirming the expected. It was important, therefore, that the execution of the sampling strategy proceeded in stages and that the appropriateness of the strata be reviewed throughout the investigation. As Judge et al. have pointed out, "...stratification is an assumption, and must be tested for validity as must any link in the scientific process" (1975:89).

To test the reliability and usefulness of the survey stratification, the sampling originally was arranged in two stages. For the initial stage, a 1 % random sample of the area

TABLE 2.1: Comparison of Subsurface Discovery Techniques
(from McManamon 1981c:204)

Site Number	Shovel Test Pits		Auger		Core	
19BN300	2/4[a]	50%[b]	3/13[a]	23%[b]	0/9[a]	0%[b]
19BN301 (1st transect)	5/7	71%	11/18	61%	0/14	0%
19BN301 (2nd transect)	4/4	100%	5/11	46%	0/12	0%
19BN305 (1st transect)	4/4	100%	0/9	0%	0/9	0%
19BN305 (2nd transect)	3/5	60%	4/14	29%	0/14	0%
19BN291	2/2	100%	3/3	100%	0/3	0%
19BN169	5/5	100%	8/9	88%	0/9	0%
19BN284	2/2	100%	1/2	50%	0/3	0%
19BN282	4/4	100%	7/13	54%	0/8	0%
19BN292	9/14	64%	12/27	44%	1/19	5%
TOTAL	40/51	78%	54/119	45%	1/100	1%

[a] number of test units with cultural material recovered/number of test units dug.

[b] percentage of test units within site area in which artifacts were discovered.

of each stratum was drawn as a pilot sample so that estimates could be derived to test the stratification. During the course of drawing the pilot sample, differences in the frequency of archeological resources in sample units associated with different types of water sources in Stratum I were noticed. Care was then taken to insure that at least 1 % random samples were drawn from each of the various subarea types as defined by their water source associations in Stratum I. The objective here was to insure that sites within each different subarea had an equal chance to be discovered.

To test the original sampling stratification, the unit of analysis was the sample unit rather than the site. The frequency of sites within each sample unit was regarded as a variable. The frequency distribution of values among sample units for this variable was described by the sample mean, sample standard deviation, and standard error of the sample mean. Because the sample units are the units of analysis, estimates of site frequencies can be derived using formulas for simple random sampling as long as estimates are for individual stratum.

If these mean frequencies were used to estimate the number of sites within any given stratum the estimate would be artificially high. This is because most sites lie only partially within any single sample unit. It is a common problem facing archeologists attempting to use probability samples for estimating site frequencies (Plog et al. 1978:395-400; Nance 1980). Estimates based on the mean frequencies were used here, but only to compare patterns of site frequencies among the different kinds of areas tested. Since each estimate is similarily biased, correction factors are not needed. For estimates that are to be used in an absolute sense to infer specific activities or for comparison with other estimates, use of a factor to correct this sampling error is advisable.

Estimates of the mean frequency of prehistoric sites per sample unit for different parts of Stratum I indicated differences among them (Table 2.2). The differences in estimated mean frequency among the subareas were not clear cut because of the relatively large standard errors of the mean. It was possible, however, to use additional information from the pilot sample to distinguish among the Stratum I subareas according to the characteristics of the prehistoric sites found in them. The sites in the Herring and Pamet River areas and around the ponds all had very small assemblages of less than eight artifacts and often were within site areas with larger historic period artifact assemblages. The Nauset area, on the other hand, contained only a few of this kind of site. For the most part, prehistoric sites at Nauset covered large areas and contained large artifact assemblages. The areas along streams and hollows and around interior fresh-water wetlands were different from any of the other areas in that they seemed to contain much less densely distributed prehistoric sites since none were discovered as part of the pilot sample.

TABLE 2.2

Estimates of Prehistoric Site Frequency for Sampling Stratum I Subareas Based on the Initial 1% Sample

Area and (Revised Stratum)	Number of Sample Units	% of Area Sampled	Mean Frequency of Prehistoric Sites per Sample Unit (68% confidence limits)
Nauset Bay (IA)	5	5.8	.80 ± .58
Herring River (IB)	3	4.0 (approx.)	.67 ± .66
Pamet River (IB)	2	4.6	.50 ± .50
Ponds (IB)	5	1.4	.40 ± .25
Streams (IB)	4	6.4	none discovered
Hollows (IC)	2	1.0	none discovered
Interior Wetlands (IC)	2	1.3	none discovered

TABLE 2.3

Estimates of Prehistoric Site Frequency for the Revised Sampling Strata

Stratum	Number of Sample Units	% of Stratum Area Sampled	Mean Frequency of Prehistoric Sites per Sample Unit (68% confidence limits)	$s_{\bar{X}}/\bar{X}$
IA	6	4.8	1.30 ± .74	.57
IB	19	3.4	.32 ± .12	.37
IC	4	1.1	rare	-
II	23	1.1	.04 ± .04	1.00

Differences in the mean frequencies and the kinds of sites per sample unit provided not only criteria, but also a justification for refining the sample strata. Table 2.3 shows the recalculated mean frequencies and standard errors for the new strata and Figure 2.1 shows their locations. Logistical concerns and environmental characteristics suggested that it was better to combine stream areas with the rivers and ponds, rather than with the hollows and interior fresh-water wetlands. In the revision Stratum IA includes a small area known as High Head in the northern part of the study area just south of Pilgrim Lake. Only one sample unit was placed there during the pilot test sampling; however, that unit contained two prehistoric sites. The high site density suggested for this area by the contents of this single unit indicated that the area should be considered together with Nauset as Stratum IA. Following further analysis during 1980 and 1981, High Head was designated as a separate sampling stratum, as described below.

Once the pilot sample and its analysis were complete, a decision was made about whether to continue the stratified random sampling procedure. The number of additional sample units that had to be tested in order to achieve a reasonable level of reliability for prehistoric site frequency estimates was considered. In order to achieve a ten percent standard error of the mean and confidence limits of 80 % for the kinds of estimates shown in Table 2.2, Stratum IA had to be tested by 38 units, IB by 22 and II by 151. No estimate was possible for IC because no prehistoric sites were found in it during the pilot sample. The method and calculations used to derive these estimates are described completely in McManamon (1981c:209-211).

Additional Survey and Sampling

Following the pilot sample and strata redelineation, it became clear that the number of additional sample units necessary to obtain reasonable mean site frequency estimates could not be tested in the time remaining during the 1979 field season. In order to obtain reasonably precise estimates in at least two strata, the remaining time during 1979 was spent in testing units in Strata IA and IB. The former contained the greatest density and spatial variation of prehistoric remains, while the latter contained the greatest number of historic period remains. Moreover, estimates of additional necessary sample units for these strata were small enough to make their ultimate testing possible. Additional sample units in Strata IC and II were deferred until later years of the survey.

Sample units in the second group were selected in the same way as the pilot sample units. In the few cases where a new unit overlapped one of the old ones by more than one half, the new unit was discarded. If an overlap was less than one half, the new unit was shifted slightly to make it lie adjacent to the unit drawn earlier. Some units contained privately owned sections.

Access to these was secured from landowners before a crew tested the unit. If after two attempts to contact owners by phone and/or by visiting the property the landowner could not be reached, the unit was discarded from the sample and another one chosen.

By the end of the 1979 field season, 115 sample units had been completed. Additional sample units were done in 1980, 1981, and 1982 to increase the size of the sample in each stratum (Table 2.4).

Analysis of the 1979 and 1980 sample unit data (McManamon 1982:16-20) suggested that the stratification in the High Head area of North Truro might be inappropriate. One large prehistoric site area, 19BN281, was discovered there in Stratum II, about 300 m from the border with Stratum IA. Other prehistoric sites both from the survey, 19BN356/357, and reported by Moffett (1962), occur in Stratum IC slightly southeast of 19BN281. The desirability of considering High Head as a separate sample stratum from the rest of IA at Nauset was reinforced by the results of the second group of sample units tested there in 1979. These units were mainly devoid of prehistoric remains, a pattern quite dissimilar from most units at Nauset.

During the Fall of 1981, a new sampling stratum was framed in the High Head area (Figure 2.3) and eight sample units were tested. An additional twelve were tested in 1982.

Site Examination

The second kind of data collection was site examination. Three levels of site examination were used during the course of the survey: (1) initial, (2) probability, and (3) systematic and judgmental.

During 1979 examination was limited to shovel test grids done immediately following site discovery. During field seasons in 1980, 1981, and 1982, more intensive testing including both shovel tests and excavation units occurred at a number of sites (Table 2.5). Specific applications of the site examination strategy, as well as the techniques used for it, evolved over the three field seasons. The basic goals and approach of examination, however, remained the same: (1) to collect reliable samples of contents from all parts of site areas, (2) to examine the structure of archeological deposits in all parts of site areas, (3) to recover material for dating archeological deposits. The recovery of dateable material, either through C-14 or temporally diagnostic artifacts, received special emphasis because it was crucial for the analysis of temporal variation of prehistoric cultural adaptations.

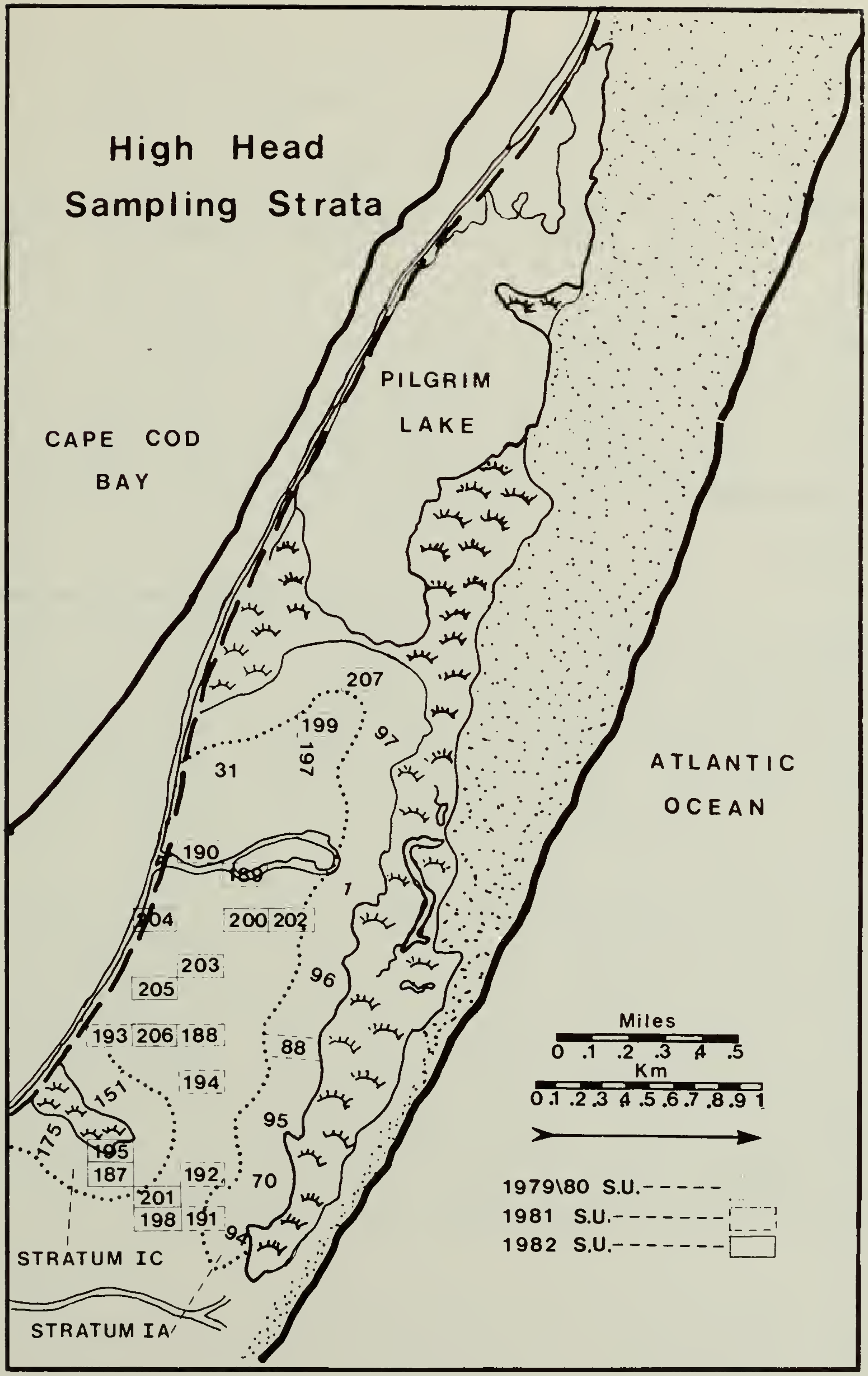
High Head
Sampling Strata
PILGRIM
LAKE
CAPE COD
BAY
ATLANTIC
OCEAN
207
199
197
97
31
190
189
1
204
200
202
203
205
96
193
206
188
88
194
151
95
175
195
187
192
70
201
198
191
94
STRATUM IC
STRATUM IA
Miles
0 .1 .2 .3 .4 .5
Km
0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
1979\80 S.U.
1981 S.U.
1982 S.U.

Figure 2.3

TABLE 2.4

Number of Sample Units Completed by Year

Stratum	Year 1979	1980	1981	1982
IA	38	0	0	0
IB	46	5	0	51
IC	8	22	0	1
II	21	0		
Provincelands	2	0	0	0
High Head	0	0	8	12
TOTAL	115	27	8	64

Initial Site Examination

Following its discovery, every site was subjected to initial site examination. Sites discovered within sample units were tested using additional shovel tests. When a shovel test discovered artifacts, four additional tests were dug halfway between it and the next ones in the original 32 unit grid. If no cultural material occurred in one of these tests, another was dug between it and the original. If the middle test contained cultural material, the next test of the original 32 was dug. This method allowed the consistent, systematic collection of a sample of artifacts from each site area and data to make rough estimates of site boundaries and artifact densities. In the field, boundaries were usually established when two consecutive shovel tests did not contain artifacts. The operational definition of "artifact" in the field was not limited to bifacial or retouched lithics and pottery: it included all kinds of flakes and other chipped stone debris.

Probability Site Examination

In 1980 the strategy for site examination initially envisioned each site area divided into 10 x 10 m units within which one 50 x 50 cm excavation unit, its location randomly selected, would be excavated. This strategy was instituted in the examination of 19BN281 where it was discovered to be far too time consuming for general application. Too many excavation units were required, and 50 x 50 cm units were not the most efficient or effective unit for site examination.

The strategy was modified slightly; site areas continued to be divided into 10 x 10 m units and an excavation unit, 1 x 1 m or slightly larger, was chosen randomly from within each. The entire site was not covered, however. Instead, a unit or units first were excavated in the part(s) of the site where the densest deposits were expected, based upon the results of the prior shovel test grid. As time allowed, or discovery required, additional units were placed outward in all directions from the central 10 m square. Excavation unit size was increased from 50 x 50 cm to 1 x 1 m or slightly larger units after timed study showed that the latter which examined at least three times the soil volume of the former could be excavated and recorded in only about twice the time. The larger units were desirable also because of the greater likelihood of recognizing subplowzone features in them.

Since the data from this stage of site examination included a probability technique for selecting the location of excavation units, they could be used to estimate with confidence limits the mean frequencies of various artifact types within examined areas. They did not provide useful data on the structure of

TABLE 2.5

Site Examination 1980-1982

Site Number	1980	1981	1982
19BN308	P	S/J	
19BN323		S/J	
19BN273/275	P	S/J	
19BN274/339	P	S/J	
19BN340	P	S/J	
19BN341	P	S/J	
19BN288	P	S/J	
19BN390		S/J	
19BN333		S/J	
19BN336		S/J	
19BN337		S/J	
19BN374	S/J		S/J
19BN434			S/J
19BN471			S/J
19BN355		S/J	
19BN356		S/J	
19BN282/3/4		S/J	
19BN415/481			S/J
19BN288	P		
19BN410		S/J	

Key:
P = Probability site examination
S/J = Systematic and judgmental site examination

archeological deposits, however, and additional excavation units were placed in some site areas. This additional examination is referred to here as systematic and judgmental site examination.

Systematic and Judgmental Site Examination

The 1980 site examination results showed that most sections of most sites in the study area had been plowed. This meant organic remains with undisturbed context suitable for radiocarbon dating would have to be sought in subplowzone features. The 1980 results also showed that these features, which were important because of their potential for containing dateable, organic remains were either very rare or very clustered, or perhaps both. During the Fall 1980 fieldwork at 19BN374, site examination strategy was modified so that blocks of excavation units were placed judgmentally where the densest deposits were expected. Units in these blocks initially were arranged to touch only at the corners creating a checkerboard-like pattern of excavation units and intervening unexcavated squares. The reason for this was to maximize the amount of edge per excavated volume so that the greatest possible likelihood of intersecting subplowzone features was realized.

The selection of excavation unit locations for 1981 and 1982 site examination was judgmental based upon the indications from shovel test grids and in some cases prior excavation units, of where the densest and/or most complex deposits were likely. At several sites additional systematic shovel test grids were used to improve the resolution of deposit density extrapolations. In some cases these grids covered site areas beyond the original sample unit boundaries (19BN282/283/284; 288; 308; 374) as well as providing more intensive coverage of site areas within the sample unit boundaries.

Site Examination: Summary

The main function of the site examination was to provide an accurate picture of the contents and spatial structure of the sites and intrasite concentrations. Individual concentrations encompass relatively small portions of sites; therefore, few concentrations contain enough randomly selected excavation units for reasonable confidence limits to be calculated around estimates of the average frequencies of artifact types or other remains. There is no question that such statistical limits would be very useful for judging the precision of the available estimates (e.g., Redman and Anzalone 1981; Nance 1981). The large number of sites and the sizeable site areas examined by this study, however, prevented the placement of enough sample units (i.e., excavation units) within most concentrations to generate meaningful confidence limits for the estimates.

The sites that were selected for detailed examination subsequent to their discovery and initial testing were selected purposefully. Those selected encompassed all of the variation recognized in the preliminary analysis (McManamon 1982). Sites with the most diverse and complex deposits were favored over relatively simple sites, although these also were represented. All parts of the study area where sites occurred with any substantial frequency were represented, as were two sites that are located in areas where the survey did not discover substantial numbers of sites. Both of these sites, 19BN471 and 19BN410, were located through informants.

Generally speaking, all areas of a site were tested at an even interval, usually a maximum of 10 to 12.5 m, by shovel tests. Excavation units between 50 x 50 cm and 2 x 2 m were placed in parts of site areas where deposits were especially dense or complex. This approach provided an extensive sample of the contents, at least the most common remains, that occur in all sections of the site. The shovel tests at a relatively intensive grid interval were designed to provide these data at a minimum. Through excavation units, data about the stratigraphy, features, and other aspects of the structure of sites or concentrations have been collected. Excavation units also served to provide data on the contents of areas where they were placed. The judgmental placement of some excavation units permitted focusing attention on areas where *in situ* organic remains could be recovered for C-14 data and where dense artifact deposits occurred, increasing the likelihood of recovering typologically dateable projectile points and pottery. This approach to examination was a compromise between the extensive coverage of shovel tests and the greater clarity of site structure afforded by excavation units.

The extensive and systematic coverage of site areas afforded by the shovel test grids provided a data base with which to investigate intrasite distributions of artifacts and other remains. The next chapter describes the method and techniques that were used to divide sites into more spatially, temporally and behaviorally discrete units.

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CHAPTER 3

Geographical Orientation and Intrasite Units of Analysis

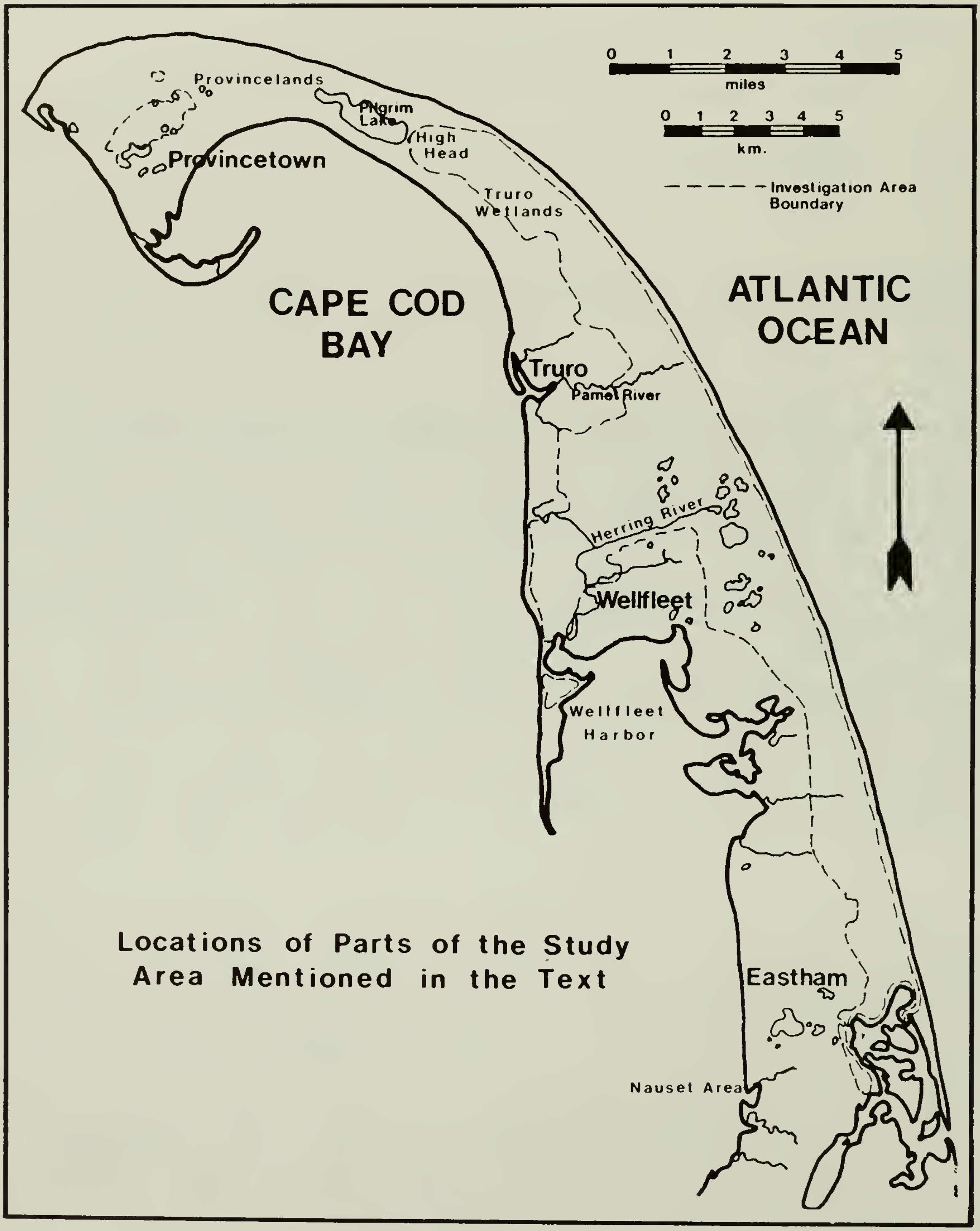
Francis P. McManamon

This chapter provides information about the locations and environmental characteristics of sites; it also describes the intrasite units of analysis called "concentrations." For the most part, the sites analyzed in this study spatially cluster in two parts of the investigation area (Figure 3.1): (1) at the southern end of the area, along the shore of Nauset Harbor (Foldout Map B); and (2) at the northern end of the area on uplands near High Head (Foldout Map C). The topographic and other natural features of these two areas are illustrated on Figures 3.2 and 3.3.

Nauset Harbor is a large tidal lagoon containing 1,350 acres. Much of the area currently is covered by extensive stands of mature salt marsh (Leatherman 1979a). It has a pronounced tidal range of between 7 and 2.2 feet, which exposes mudflats and shellfish beds along the shoreline. The sites in this area range in elevation from just above sea level to 30-40 feet above sea level. All of the sites are within 200 m of the marsh boundary.

High Head is the northernmost portion of the glacial outwash plain that forms the spine of the outer Cape. It has a rolling topography punctuated by kettleholes, most of which now are dry or are thickly vegetated bogs. Much of the area around High Head is covered by a veneer of postglacial, probably historic, aeolian sand ranging from a few to several hundred centimeters in thickness. This area is from 50 to 60 feet above sea level. Before the Provincelands began to form about 6000 years ago, High Head was a long headland exposed to the sea. This exposure to marine erosion created a pronounced scarped cliff separating High Head from lower-elevation deposits that were formed along its eastern edge and north of it by subsequent erosion and longshore currents (Fisher and Leatherman 1979; Leatherman 1979b).

The methods and techniques used to discover and examine each site area were described and assessed in the last chapter. The


Provincelands
Pilgrim Lake
High Head
Provincetown
Truro Wetlands
CAPE COD BAY
ATLANTIC OCEAN
Truro
Pamet River
Herring River
Wellfleet
Wellfleet Harbor
Eastham
Nauset Area
0 1 2 3 4 5
miles
0 1 2 3 4 5
km.
Investigation Area Boundary

Locations of Parts of the Study Area Mentioned in the Text

Figure 3.1

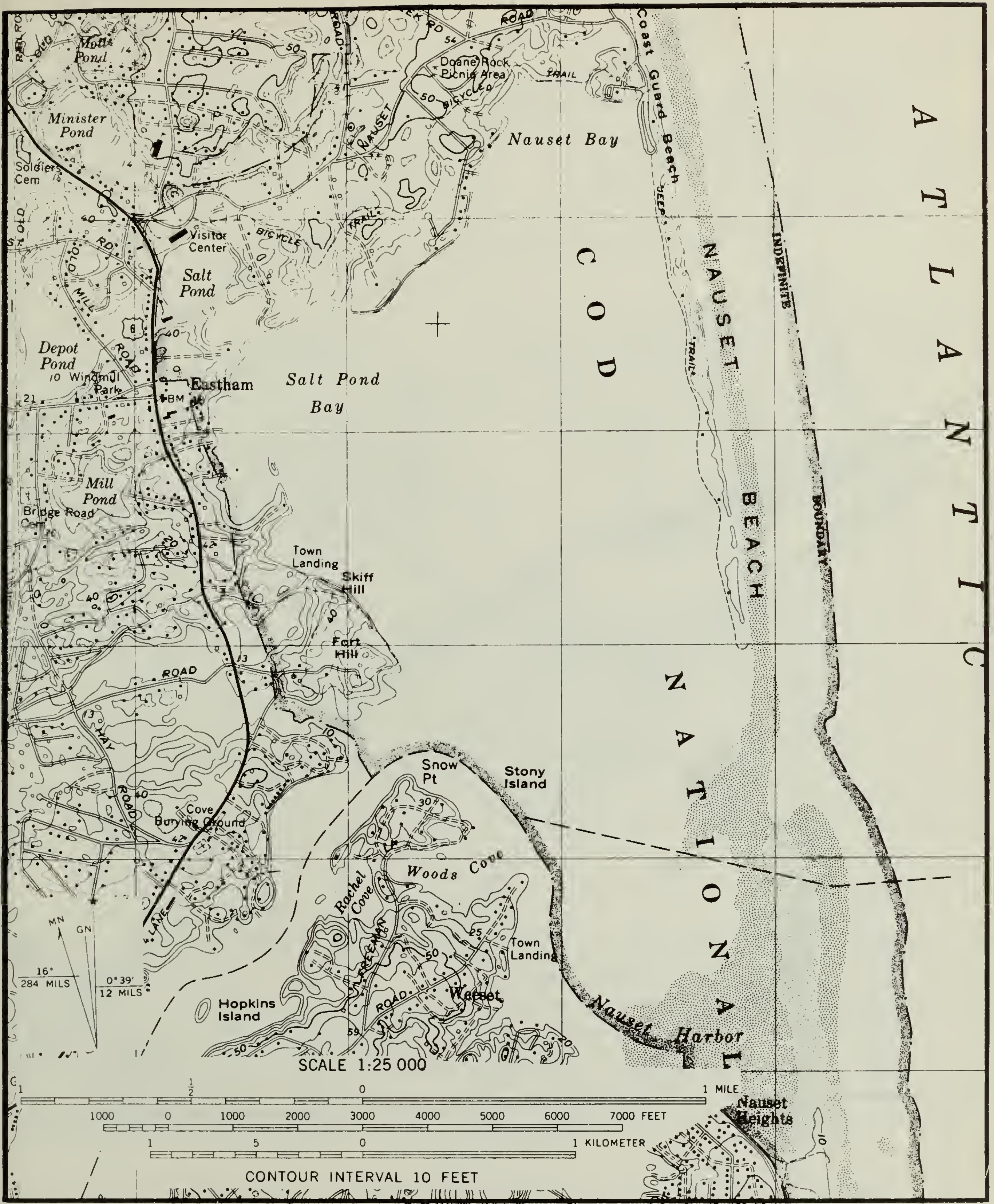

Motts Pond
Minister Pond
Soldiers Cem
Doane Rock Picnic Area
Nauset Bay
Coast Guard Beach
Visitor Center
Salt Pond
Depot Pond
Windmill Park
Eastham
BM
Salt Pond Bay
C O D
N A U S E T
B E A C H
A T L A N T I C
Mill Pond
Bridge Road Cem
Town Landing
Skiff Hill
Fort Hill
ROAD
HAY ROAD
OLD MILL ROAD
BICYCLE TRAIL
JEEP TRAIL
INDEFINITE BOUNDARY
Cove Burying Ground
Snow Pt
Stony Island
Woods Cove
Rachel Cove
Town Landing
Hopkins Island
Weeset
Nauset Harbor
N A T I O N A L
Nauset Heights
MN
GN
16°
284 MILS
0°39′
12 MILS
SCALE 1:25 000
1 ½ 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER
CONTOUR INTERVAL 10 FEET

FIGURE 3.2

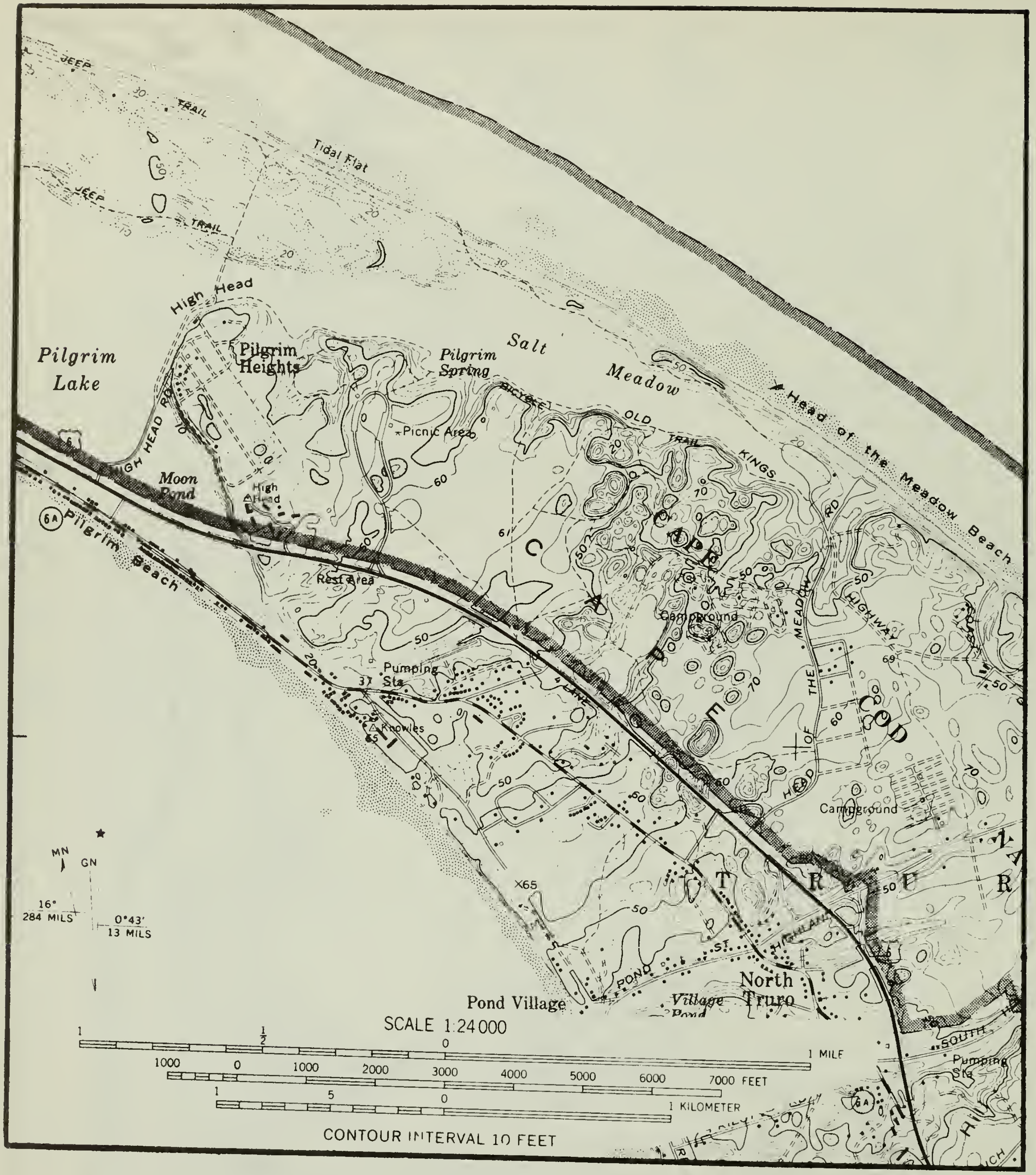

JEEP TRAIL
Tidal Flat
High Head
Pilgrim Lake
Pilgrim Heights
Pilgrim Spring
Salt Meadow
Head of the Meadow Beach
OLD KINGS HIGHWAY
BICYCLE TRAIL
HIGH HEAD RD
Picnic Area
Moon Pond
High Head
6
6A
Pilgrim Beach
Rest Area
CAPE COD
Campground
HEAD OF THE MEADOW RD
Pumping Sta
Knowles
Campground
TRURO
North Truro
Pond Village
Village Pond
POND ST
HIGHLAND
SOUTH
Pumping Sta
X65
MN
GN
16°
284 MILS
0°43′
13 MILS
SCALE 1:24 000
1 ½ 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER
CONTOUR INTERVAL 10 FEET

FIGURE 3.3

next section of this chapter describes how intrasite spatial variation in the density of artifacts, shell and fire-cracked rock (fcr) were used to delimit units of analysis within the site areas. Subsequent sections will describe specific sites and the concentrations within them.

The Definition of Units of Analysis

An essential step for quantitative analysis is the careful identification of comparable units. "Site," as it was used in this investigation, designates units that are too large and variable to be compared directly. Sites range from large, multi-acre areas such as 19BN308 with components from Late Archaic through Late Woodland and complex as well as simple deposits to small sites with only simple deposits such as 19BN340. By defining intrasite units of analysis I hoped to partition the intrasite variation into spatial units that could be compared more directly and in more detail than the larger sites.

Archeologists use "site" as a general term that refers to a variety of archeological deposits. Willey and Phillips (1958:18) aptly summarize the variation in the application of this term:

> A site is the smallest unit of space dealt with by the archeologist and the most difficult to define. Its physical limits, which may vary from a few square yards to as many square miles, are often impossible to fix. About the only requirement ordinarily demanded...is that it be fairly continuously covered by remains of former occupation and the general idea is that these pertain to a single unit of settlement...it rarely turns out to be that simple.

The kinds of deposits to which the term has been applied vary; so do the criteria used by different archeologists to draw site boundaries. Some, for example, regard only areas with dense artifact or midden deposits as sites; some draw boundaries at a certain frequency of a particular artifact type; still others consider any subsurface cultural remains as a site. The problems that this causes for comparative studies have not gone unnoticed (Dekin 1980a:25-26; Dincauze 1980:40). These problems have contributed to the lack of quantitative multisite studies, which require units of analysis at least roughly similar to make legitimate comparisons.

"Site" was used in this study to refer to a bounded area within which artifacts occur. The discovery of a single artifact as well as the discovery of thousands indicated the existence of a site. Site boundaries were set along contour lines of artifact density, interpolated from shovel test and excavation unit data, beyond which artifacts were not expected to occur, i.e., the zero isopleth. In the context of this study, then, sites were contiguous areas that contained a veneer of deposits with a density of at least one artifact per shovel test.

Defining Concentrations

This study began by considering the archeological remains as they were discovered and delimited by the fieldwork and preliminary analysis. The one artifact per shovel test contour line served as the site boundary during the fieldwork. In the preliminary analysis (McManamon 1981b, 1982), the three artifacts per shovel test isopleth was used to delimit subareas within sites for comparisons. The latter value was chosen judgmentally after inspecting a series of site maps with contour lines of various frequency values. In delimiting these subareas of sites the aim was to distinguish between concentrations of remains that might represent different periods of time, different activities, or both. More complete data on the locations and densities of remains that have been analyzed since the preliminary analysis permits a more precise and detailed identification of intrasite units of analysis.

The approach used here generally follows the one suggested by Newell and Dekin (1978:13-15; see also Knoerl 1980; Versaggi 1981) to define units of analysis. Their method includes several steps. First, within each site contour lines depicting the frequency or density of artifacts and other kinds of remains are drawn to identify their spatial distribution. If more than one spatial cluster is identified within the site area, the different clusters are considered separate units of analysis. These units are areas bounded by contour lines representing a certain density of frequency of one or more kind of remains. The size, structure, shape, and contents, as well as other characteristics of each unit can then be investigated. Units of analysis are defined initially in strictly physical terms. This method makes no assumptions about the social or cultural units and the activities responsible for the artifact concentration or that all the remains are contemporaneous.

Anthropological and archeological exploration of the characteristics of these spatial units, including their contents, follows their physical definition. These subsequent analyses are the stuff from which spring behavioral, chronological, cultural, functional, and other interpretations of what each unit represents. Unless the distribution of remains results from post-depositional disturbances, the remains are the primary or secondary deposits (Schiffer 1976:66-78) of artifacts, organic and other residues related to prehistoric activities and their temporal and cultural contexts. These areas of concentrated remains are referred to in this analysis as "concentrations." They are intrasite units and the primary units of analysis for this study.

Concentrations initially were delimited in strictly physical terms without reference to their possible behavioral, cultural or chronological associations. For this reason, the term "concentration" was preferred to two others that have been used to refer to intrasite spatial units: "minimal node for articulation" and "episode."

Chang (1982:9) introduced the first of these terms. His minimal nodes are "...remains on the ground [representing] depositional unit(s) of continuous horizontal and vertical expanse..." Chang's nodes have a temporal aspect to them as well, but this is not the concern here. The spatial aspect of node is defined differently enough from concentration to make it an inappropriate substitute. For one thing, Chang's nodes are not defined in simple physical terms. From the start, they have cultural and/or functional correlates. The examples of node that he uses show this: an isolated house, a deposit of rubbish, a burial in isolation, a kill site, an overnight camp, and combinations of the above (Chang 1972:9). Chang's basic intrasite unit has the aspect of physical continuity in common with "concentrations." However, it also includes necessary "functional congruence and contemporaneity" (Chang 1972:10). While some concentrations certainly contain remains that are functionally congruent and contemporaneous, others contain remains resulting from the mixture of independent activites and/or different time periods. In either case, functional or chronological relationships are not assumed or inferred about concentrations as part of the procedures to delimit them, unlike the procedure Chang describes for delineating minimal nodes for articulation.

The term "episodes" has a shorter history as well as a closer link to "concentration." Dekin (1980b:4) relates episode to "a behaviorally discrete depositional event...evidenced by a defineable cluster of artifacts." Episodes differ from concentrations in their linkage with discrete depositional and behavioral events. As physical remains, concentrations might at some sites, especially simple ones, approximate single episodes. In other instances, however, concentrations are likely to be composites of overlapping episodes. As with nodes of articulation, episodes require either more initial assumptions about what the physical deposits represent or more results from a prior analysis for legitimate inferences about the behavioral and chronological characteristics of intrasite clusters of remains than do concentrations.

Procedure for Distinguishing Vertical Strata

Most of the archeological deposits considered in this analysis lie between the present ground surface and the bottom of the plowzone. Large expanses of the outer Cape were plowed at some point during the historic period, so plowzone soil horizons are pervasive in almost all sites. This section describes how variation in vertical archeological stratigraphy was taken into account for the analysis of intrasite horizontal distributions that led to the delimitation of concentrations.

The goal of the analysis of vertical stratigraphy was to distinguish within each shovel test and excavation unit vertical units with distinct depositional context, that is units that might be related to different depositional events. These vertical layers of soil are referred to as "strata."

All field records of shovel tests and excavation units were reviewed to identify the strata within each test or unit. Records included at least one profile drawing of each test or unit as well as notes on the excavation. They were checked to discern any evidence of vertical archeological strtification, disturbance or features. Remains from severely disturbed portions of sites were not included in the data set to be used for delimiting concentrations. Remains from undisturbed deposits, typically midden or features below the base of the plowzone, were distinguished from the overlying plowzone stratum. Except for a few complex, subplowzone middens most shovel tests and excavation units contained a single stratum, the plowzone. In portions of some sites where dense subplowzone deposits occurred they were distinguished as Stratum II.

Small numbers of artifacts sometimes were found in soil layers below the main artifact-bearing stratum. If the likelihood seemed to be that these had worked their way down naturally from the upper layer, they were considered part of the assemblage from the overlying archeological stratum.

Subplowzone features were regarded as separate strata. Their contents and volumes were not included in the Stratum I assemblages or the volumes that were used to delimit concentrations.

Procedure for Delimiting Concentrations

The first step in identifying where remains were clustered within site areas was to assemble data on the frequency of remains recovered for each shovel test and excavation unit. Lithics (chipped stone), shell and fire-cracked rock were the most common and frequent kinds of remains. They are likely to have been associated with a wide range of activites and were chosen for delimiting concentrations. A variety of shellfish species were represented among all sites. *Mercenaria mercenaria*, the hard shell clam, was normally the most frequent species by far. For the identification of concentrations, however, the weight of total shell was used so that those areas where remains of other shellfish species occurred in large amounts would be identified.

Two basic kinds of test units-- shovel tests and excavation units-- were used during the survey. The former were normally 40 cm in diameter and 30-75 cm deep, but both dimensions varied.

Shovel tests typically were excavated as single vertical units without different levels being distinguished. Excavation unit dimensions ranged from 50-150 cm. Most units were square, but a few were rectangular. They were dug using a combination of natural and arbitrary levels depending upon the context. Depths of levels within excavation units varied according to soil stratification or the precision with which arbitrary levels were excavated. Shovel tests usually did not have more than one vertical stratum, labelled Stratum I. Many excavation units also contained only Stratum I. In some excavation units, however, substantial subplowzone cultural deposits occurred. As described in the preceding section, these were kept distinct from Stratum I and were referred to as Stratum II. In a very few instances historic period fill was superimposed on plowzone or undisturbed archeological deposits. For these few cases, such overlying fill layers naturally were not included in the analysis of intrasite horizontal artifact distribution.

The volume of each stratum within each test unit was estimated using field recording forms and profile drawings. For most units this was a relatively simple, though time-consuming, matter of estimating the thickness of the plowzone. In order to compare the artifact densities from all the units, most of which had somewhat different volumes, it was necessary to estimate the density of remains that would be expected from each unit given a uniform volume. Volume was used rather than a simpler measure based upon area because of the known variation in the thicknesses of Stratum I within different shovel tests and excavation units, as well as the variation in test unit volumes. Several standard volumes were considered and .25 cubic meters finally was chosen. Stratum I within many of the excavation units had a volume close to a quarter cubic meter (qcm), reducing the amount of artificial expansion or contraction of estimated densities of remains for these units. Selection of this standard volume, however, did result in the multiplication of all frequencies for shovel tests. The multiplication usually meant that projected densities of shovel test remains were 5 to 9 times the actual frequency of remains.

The density per .25 cubic meters of the number of lithics (all chipped stone), grams of shell and grams of fire-cracked rock were calculated for each unit and mapped. Site maps with scale of approximately 1:470 (1 inch = 10 m) then were used to draw density contour lines for lithics and shell. Fire-cracked rock densities turned out to be very concentrated in a handful of units at almost all sites; these locations were mapped but contour lines were not necessary.

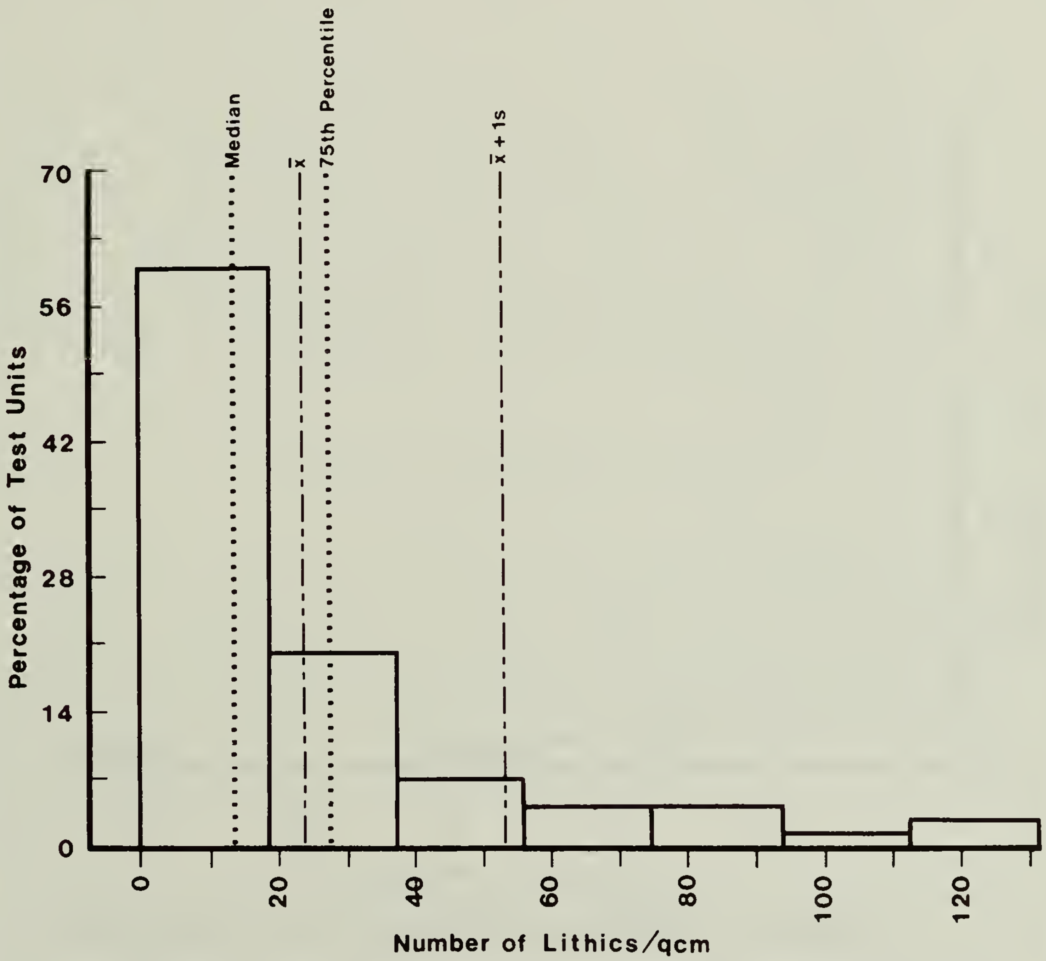
Several avenues were pursued in the selection of values to be used for the lithic and shell contour lines. The intitial intent was to use for each variable at each site the mean and various multiples of the standard deviation above and below the mean as contour lines (e.g., Knoerl 1980; Versaggi 1981). Inspection of the distribution of values for lithics and shell at many sites, however, showed that they were far from normally distributed (Figures 3.4 and 3.5). A preponderance of low values at most sites skewed the distributions strongly to the left. As an experiment, values for lithics densities at one site (19BN274/339) were transformed using the square root transformation, which tends to increase the normality of a distribution (Snedecor and Cochran 1967:325-327). The resultant distribution was more normal, but still substantially skewed.

At the same time that the usefulness of the mean and standard deviation was being explored, the possibility of using order statistics, specifically the median, 25th percentile and 75th percentile, was considered. The use of order statistics, particularly in the early stages of data analysis, is being championed by a cadre within the field of statistics (Tukey 1977; Mosteller and Tukey 1977; Hartwig and Dearing 1979). They believe that statistical measures that rely wholly or mainly upon the assumption of a normal distribution frequently mask as much, or more, important variation in data as they illuminate. Clark (1982:248ff) recently considered how such an approach, termed exploratory data analysis (EDA), might be useful to archeologists.

The analysis reported here is not a full-blown EDA approach; however, given the shape of the distributions that were used to delimit concentrations, the use of order statistics rather than the mean and standard deviation seems justified. Since the distributions were highly skewed and even the transformed data distribution substantially skewed, the mean and standard deviation were strongly affected; however, order statistics are not so affected by extreme scores. Order statistics, therefore, more accurately describe the overall distributions and their central tendencies (Hartwig and Dearing 1979:19-23).

Beyond being a more accurate indicator of the data distributions, the median was more useful as a consistent contour for concentration boundaries because it allowed more data points to be included than did the mean. Examples of this are shown in Figures 3.4 and 3.5, which depict the distribution of lithic and shell density values per quarter cubic meter for each data point (either a shovel test or an excavation unit) in two sites examined by the survey. At 19BN274/339, if the mean value for lithics/qcm had been used as the boundary for concentrations, nearly 75 percent of the units would have been excluded based upon lithics/qcm values (Figure 3.4). A similar problem would have existed for the grams of shell/qcm values. Virtually the same pattern for both these variables also would have held at 19BN341 (Figure 3.5).

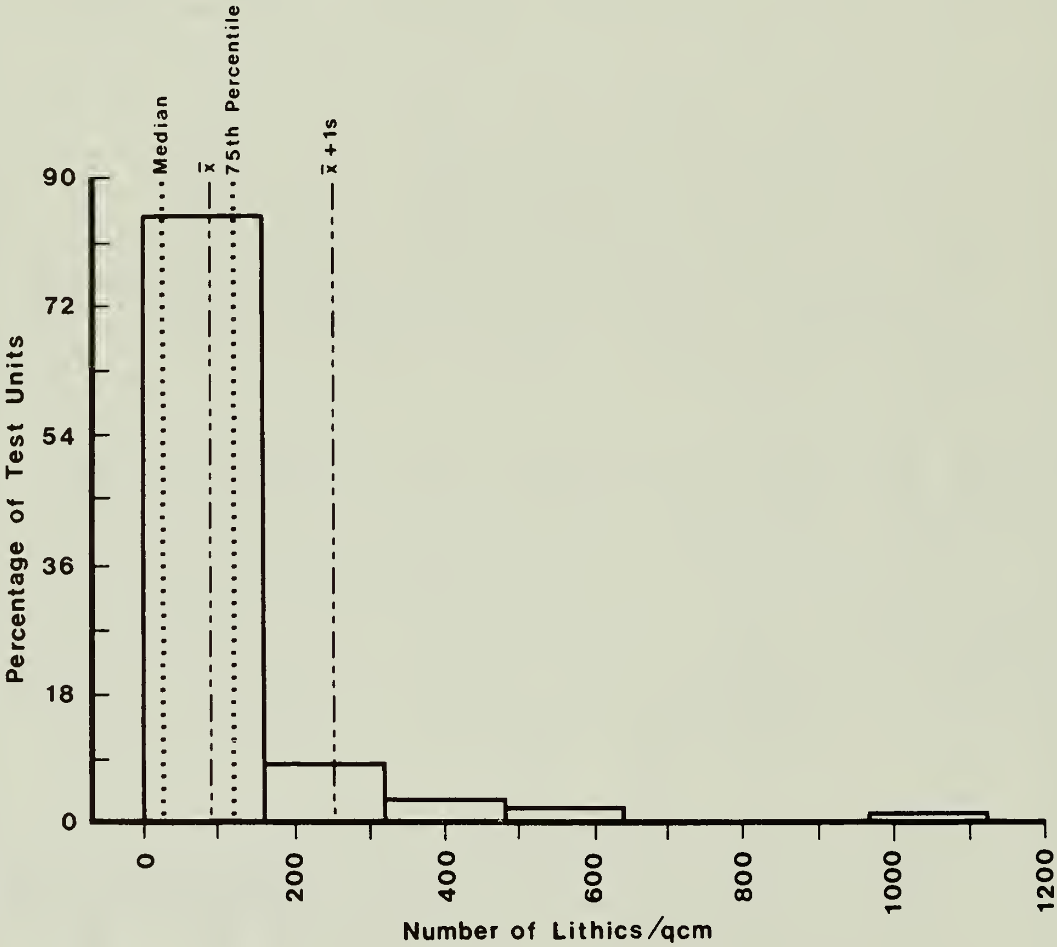
Using the mean as the boundary for concentrations indeed would have delimited areas where remains with the very highest densities were concentrated, but only those few areas. While it was desirable to be able to distinguish those areas where remains were most dense, it would have been myopic to have limited



Frequency of Artifacts/per Quarter Cubic Meter

at 19BN274/339

Figure 3.4



Frequency of Artifacts/per Quarter Cubic Meter

at 19BN341

Figure 3.5

analysis to these areas. The median and 75th percentile offered alternatives to use of the mean and some multiple of the standard deviation. The median provided a boundary that excluded the lowest scores but allowed many moderate and all high values to be included within concentrations. The 75th percentile contour identified those areas where the highest densities occurred. These two values were used as the density contour lines for the maps used to delimit concentrations.

Density contour lines using the median and 75th percentile values for lithics/qcm and grams of shell/qcm were drawn on the large scale maps for each of the 18 site areas included in this analysis. These lines were used as a guide in drawing boundaries between concentrations and nonconcentration areas and among concentrations. In some instances natural topography was used as a guide to concentration boundaries. At 19BN288, where a ridge runs through the site area with remains also occurring on the ridge slopes, for example, areas within the same lithic density contour line were divided into different concentrations based upon their location on either the ridge or slopes. The next section describes specific site areas and concentrations delimited for this analysis. Special situations, such as the one just mentioned for 19BN288, also are described in it.

Sites and Concentrations

First, the nomenclature for site and concentration numbers used in this study is described. Sites were designated using the Smithsonian site numbering system, which is also the system used to record the statewide archeological inventory maintained by the Massachusetts Historical Commission. The first number is always 19, the designation for Massachusetts; the middle initials, BN, stand for Barnstable County, within which all of the study area lies. The final numbers were assigned sequentially as sites were discovered.

In some cases site designation assigned in the field had to be modified following laboratory analysis. When the materials that were recovered from the site were found to be natural, the material was discarded, the records destroyed and the site number reused. In other instances, sites designated as separate in the field were found to be parts of the same spatial spread of archeological remains. In these cases site numbers were combined to designate the site. In the text of this study, all site numbers usually were used (e.g., 19BN274/339 or 19BN282/283/284). On tables the first number alone was used sometimes because of space constraints (e.g., 19BN274/339 would be designated as 19BN274).

Concentrations were designated by adding decimals to the site numbers. Concentration numbers could run from .01 to .99, but in no instance were all the possible numbers used. For this analysis, concentration numbers were assigned beginning with .11. Concentrations in the same general parts of a site were grouped within the same decimal tenth. For example, Concentrations 308.11-308.16 all are in the north and northeastern portion of 19BN308, and Concentrations 308.71 and .72 both are in the far western end of 19BN308.

Descriptions of Sites and Concentrations

The descriptions of sites and concentrations that follow proceed from south to north beginning with 19BN308, the southernmost site in the Nauset area. Sites in the same vicinity are described together. Locations of sites within the Nauset and High Head areas are shown on Foldout Maps B and C respectively. Individual site areas and concentrations are shown on a series of more detailed maps. In order to provide a sense of how the density contour lines for lithics, grams of shell and grams of fcr compared with the concentration boundaries, Figures 3.6a-c show not only the concentrations delimited within 19BN308 and 19BN323, but also the density estimates.

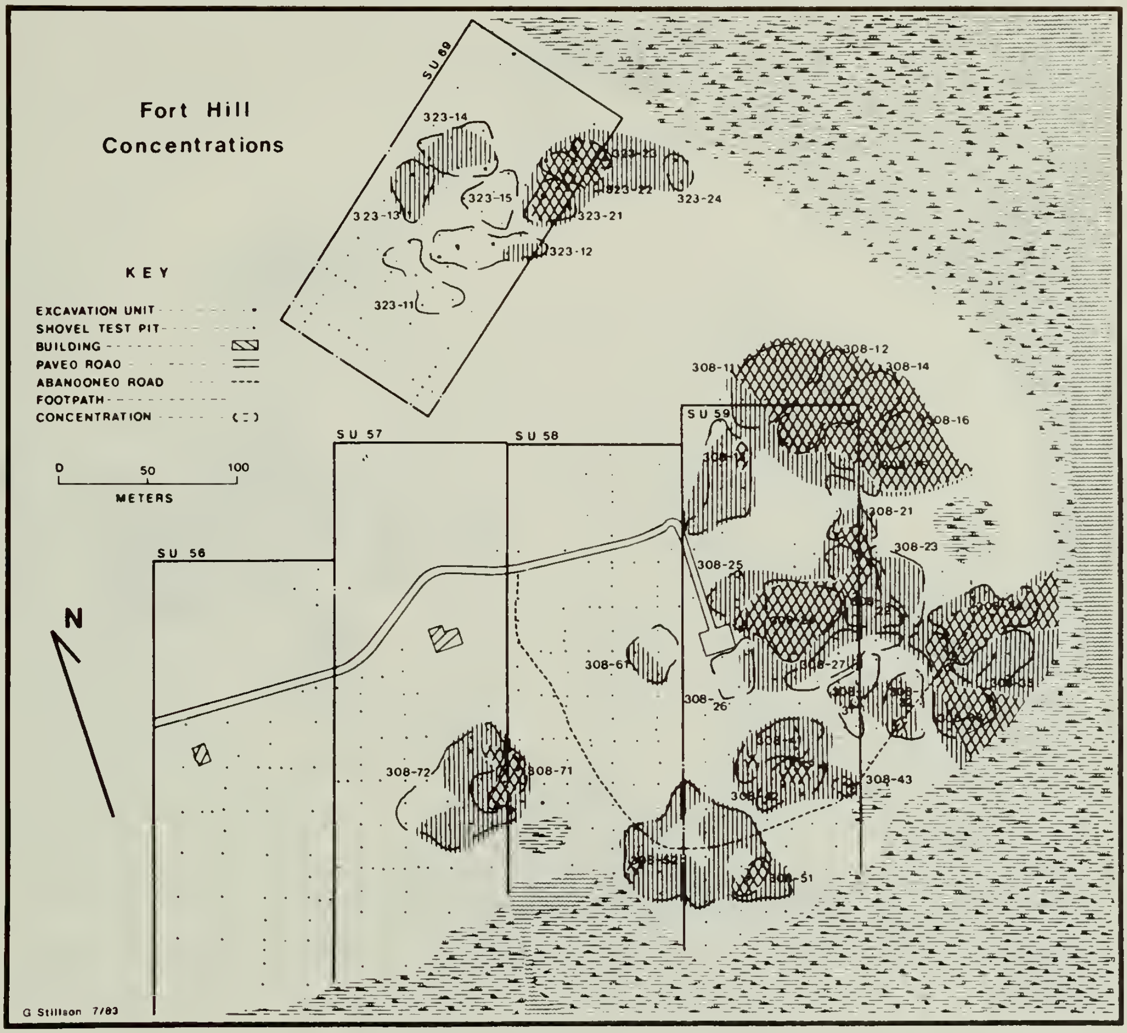
In the descriptions of concentrations that follow, "high" density means a score above the 75th percentile; "medium" or "moderate" density means a score above the median, but below the 75th percentile, and a "low" score is one below the median.

Fort Hill, 19BN308 and 19BN323

These two sites are located in the area of Eastham known as Fort Hill. Fort Hill is a prominent hill on the western side of the mouth of Town Cove overlooking the southern half of Nauset Marsh. 19BN308 covers much of Fort Hill itself and 19BN323 lies on a gentle incline immediately north of the hill (Figure 3.6 or Foldout Map D). Site 308 covers approximately 20 acres with concentrations of prehistoric remains delimited in half to one third that area. 19BN323 covers 3-4 acres with concentrations delimited in most of that area.

In 19BN308 concentrations were delimited all along the base of the hill (the base is at approximately the same location as the abandoned road shown as a dashed line on Figure 3.6). Concentrations also occur on its eastern and northeastern slopes, both of which include sizable areas that are nearly level. Both sites are mainly open fields at present with thick shrubs in wet areas, scattered evergreens in some places and broadleafed forest undergrowth vegetation in the vicinity of Concentrations 308.71 and .72 (Figures 3.7, 3.8, 3.9, 3.10).

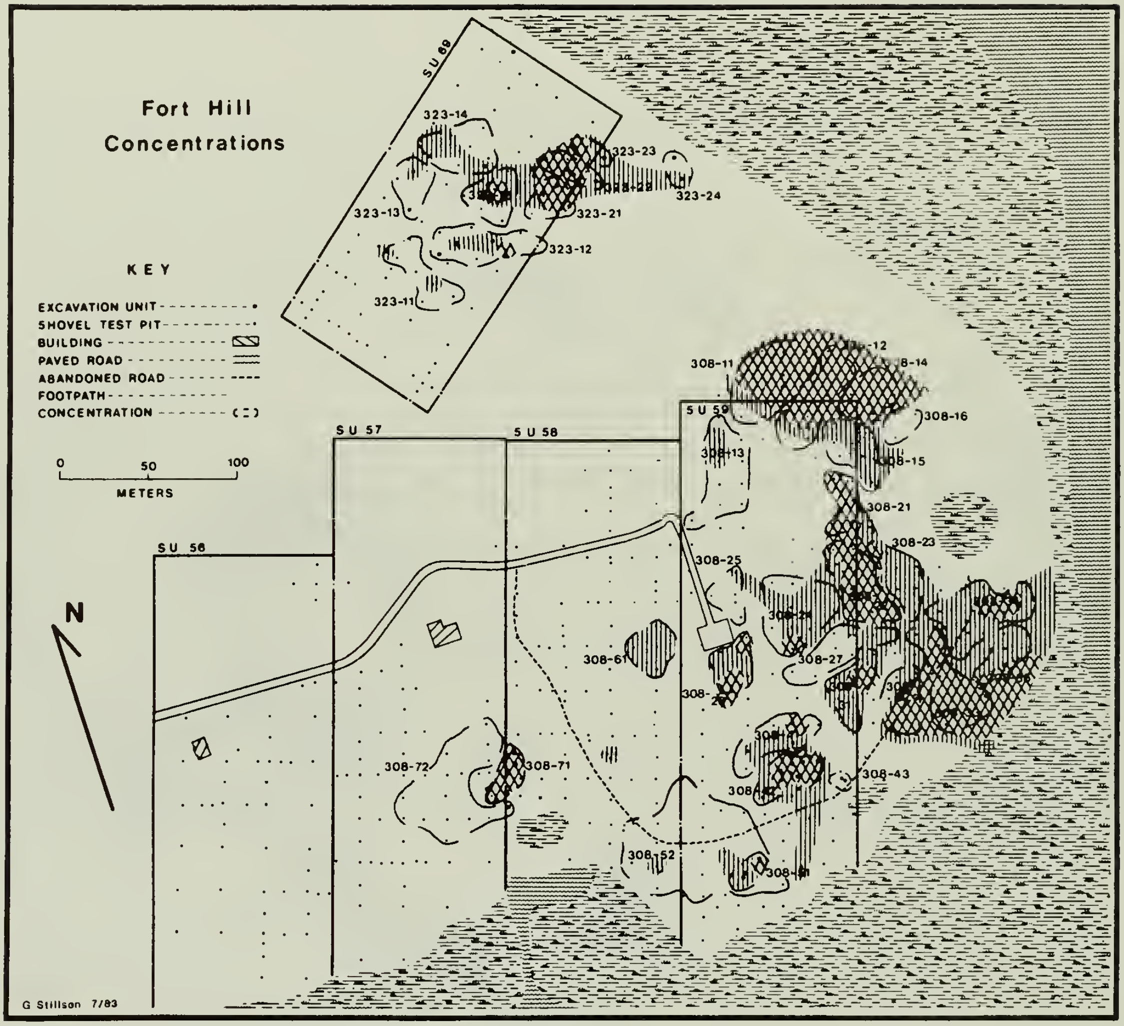
The following are brief summaries of each concentration that


Fort Hill
Concentrations
KEY
EXCAVATION UNIT
SHOVEL TEST PIT
BUILDING
PAVED ROAD
ABANDONED ROAD
FOOTPATH
CONCENTRATION
0
50
100
METERS
N
SU 60
323-14
323-15
323-13
323-23
323-22
323-21
323-24
323-12
323-11
SU 56
SU 57
SU 58
SU 59
308-11
308-12
308-14
308-16
308-21
308-23
308-25
308-61
308-26
308-27
308-72
308-71
308-43
308-51
G Stillson 7/83

▥ _ _ _ _VALUES FOR LITHICS /qcm GREATER THAN THE MEDIAN BUT LESS THAN THE 75th PERCENTILE

▩ _ _ _ _VALUES FOR LITHICS/qcm GREATER THAN THE 75th PERCENTILE

Spatial Distribution of Lithics
Figure 3.6(a)

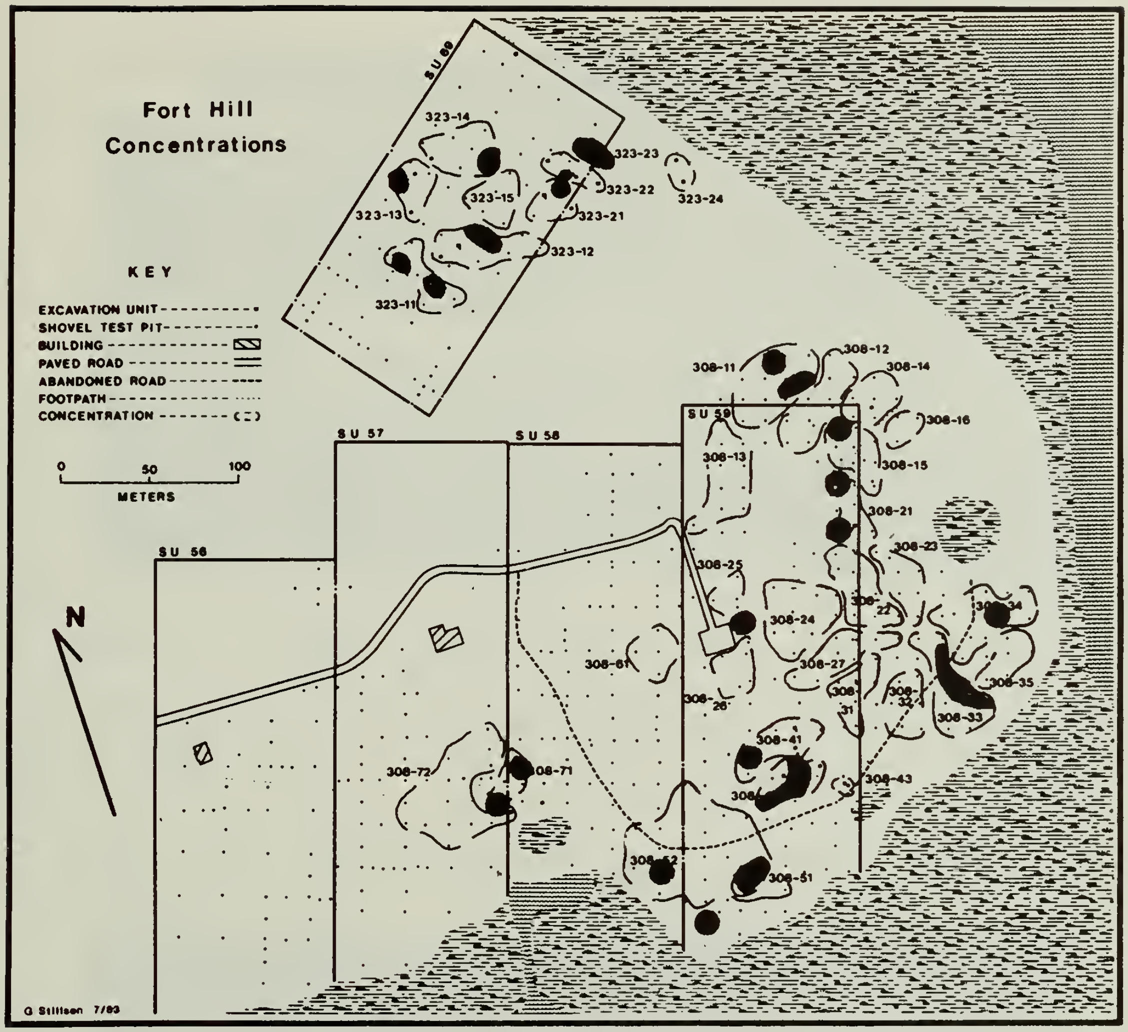

Fort Hill
Concentrations
KEY
EXCAVATION UNIT
SHOVEL TEST PIT
BUILDING
PAVED ROAD
ABANDONED ROAD
FOOTPATH
CONCENTRATION
0
50
100
METERS
N
SU 69
SU 56
SU 57
SU 58
SU 59
323-14
323-13
323-23
323-24
323-21
323-12
323-11
308-11
308-16
308-15
308-21
308-23
308-25
308-27
308-61
308-72
308-71
308-43
308-52
G Stillson 7/83

▥ – – – – – VALUES FOR GRAMS OF TOTAL SHELL/qcm GREATER THAN THE MEDIAN BUT LESS THAN THE 75th PERCENTILE

▩ – – – – – VALUES FOR GRAMS OF TOTAL SHELL/qcm GREATER THAN THE 75th PERCENTILE

Spatial Distribution of Shell Remains

Figure 3.6(b)


Fort Hill
Concentrations
KEY
EXCAVATION UNIT
SHOVEL TEST PIT
BUILDING
PAVED ROAD
ABANDONED ROAD
FOOTPATH
CONCENTRATION
0
50
100
METERS
N
SU 60
SU 56
SU 57
SU 58
SU 59
323-14
323-23
323-22
323-24
323-15
323-13
323-21
323-12
323-11
308-11
308-12
308-14
308-16
308-13
308-15
308-21
308-23
308-25
308-24
308-22
308-34
308-61
308-27
308-26
308-31
308-32
308-35
308-33
308-41
308-72
308-71
308-43
308
308-52
308-51
G Stillson 7/83

PRESENCE OF FIRE CRACKED ROCK ------------ ▬

Spatial Distribution of FCR

Figure 3.6(c)

was delimited in these two sites. The scores referred to are: number of lithics/qcm, grams of shell/qcm and grams of fire-cracked rock/qcm.

308.11: 12 shovel tests, 2 excavation units. Located in the northeastern corner of the site, all but three of its tests had values greater than the 75th percentile for lithics and shell; all but one were above the median for shell. Three units contained fire-cracked rock (fcr).

308.12: 11 shovel tests, 0 excavation units. Located in a flat area. All units had values above the 75th percentile for lithics; all but one were above the median for shell. No units contained fcr.

308.13: 9 shovel tests, 0 excavation units. Most units had values greater than the median for lithics; only two units were above the 75th percentile. Only two units had shell values above the median. No units contained fcr.

308.14: 6 shovel tests, 1 excavation unit. All units had scores above the 75th percentile for lithics and shell. No units contained fcr.

308.15: 10 shovel tests, 0 excavation units. Most units had scores above the 75th percentile for lithics. One unit was above the 75th percentile for shell, all but two were above median. Two noncontiguous units contained fcr.

308.16: 3 shovel tests, 0 excavation units. All units had scores above 75th percentile for lithics. All were below median for shell. No units contained fcr.

308.21: 6 shovel tests, 1 excavation unit. A mixture of lithic scores; some had values above the 75th percentile, some above median, two below median. All but two shell scores are above the 75th percentile. Two units contained fcr.

308.22: 12 shovel tests, 0 excavation units. Half of the units had scores above the 75th percentile for lithics, the remainder were above the median. All but two were above the 75th percentile for shell. No units contained fcr.

308.23: 7 shovel tests, 0 excavation units. Two units had scores above the 75th percentile for lithics, three were above the median and the other two above the 25th percentile. All units were above the median for shell and one was above the 75th percentile. No units contained fcr.

308.24: 10 shovel tests, 0 excavation units. This concentration was on a relatively flat area upslope from .22 and .23. Six units had scores above the 75th percentile for lithics, with the remaining four above the median. Half the units were above the median for shell with one of these above the 75th percentile. No

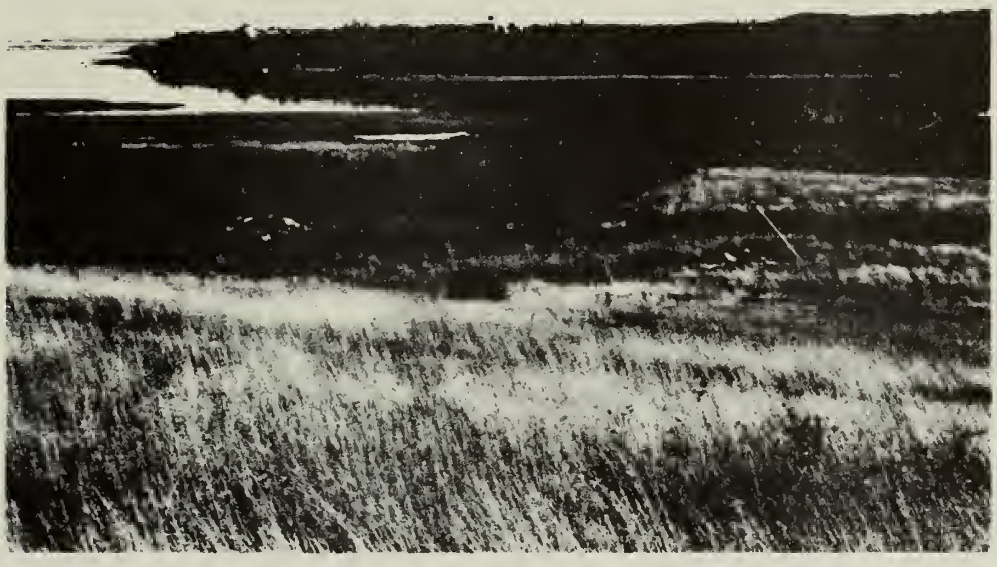


FIGURE 3.7: 19BN308, looking south from the top of Fort Hill toward 308.41, .42 and .43

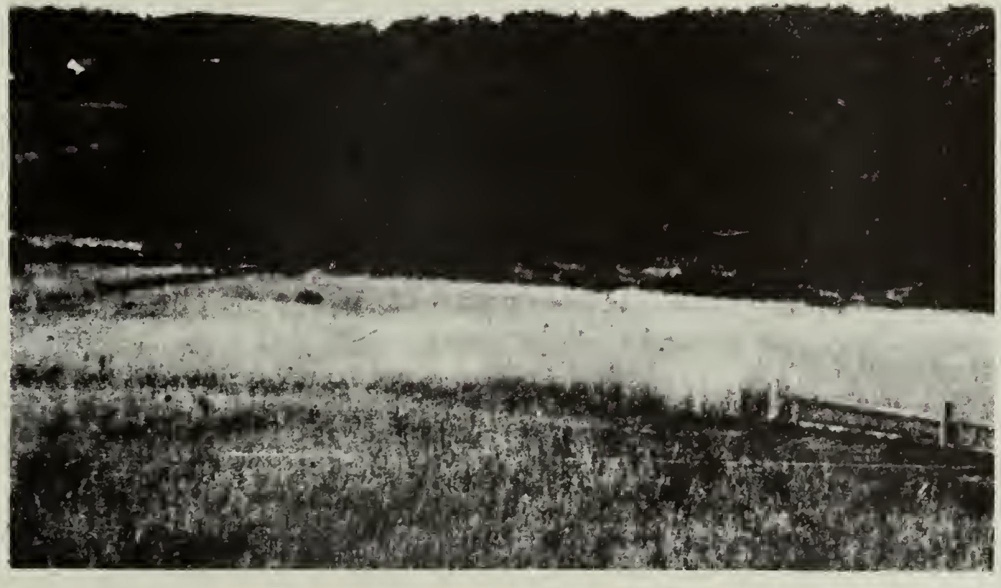


FIGURE 3.8: 19BN308, looking from the top of Fort Hill west towards 308.71 and .72

units contained fcr.

308.25: 5 shovel tests, 0 excavation units. All units had scores above the median for lithics, one of these was above the 75th percentile. One unit had a score above the 75th percentile for shell, one above the median, the others had no shell. One unit contained fcr.

308.26: 7 shovel tests, 0 excavation units. This concentration follows a relatively steep slope down from a modern parking lot on the top of Fort Hill, probably an area disturbed by the construction of the lot. Only two units contained scores for lithics above the median. All units were above the median for shell, and three were above the 75th percentile. No units contained fcr.

308.27: 9 shovel tests, 0 excavation units. This concentration is on a slope. Two units had scores below the median for lithics, the others were above the median. Only three units were above the median for shell. No units contained fcr.

308.31: 8 shovel tests, 0 excavation units. This concentration represented a constriction of the median contour for lithics and shell that separates the .20's and .30's concentrations.

308.32: 6 shovel tests, 0 excavation units. This concentration had units with mixed scores. Only one unit had scores for lithics and shell that were above the 75th pecentile. The other unit scores were above the median score in at least one of these two. No units contained fcr.

308.33: 10 shovel tests, 1 excavation unit. This concentration is the central portion of the .30's concentrations. All but two of the units had values above the 75th percentile for lithics. All but one had values above the 75th percentile for shell. Four contiguous units arranged in a line approximately north-south through the concentration contained fcr.

308.34: 10 shovel tests, 1 excavation unit. All but two units had scores above the 75th percentile for lithics. Three units in the center of the concentration had values for shell above the 75th percentile, the others were above the median. One central unit contained fcr.

308.35: 6 shovel tests, 0 excavation units. This concentration was distinguished from .33 and .34 because it has less dense lithic remains. All units contained lithic scores above the median only. One unit contained a score above the 75th percentile for shell, the others were above the median only. No units contained fcr.

The concentrations in the .40's group are portions of a discrete spatial cluster of dense remains on gently sloping and flat land along the southern base of the hill.

308.41: 6 shovel tests, 3 excavation units. One unit had a score above the 75th percentile for lithics, the others were above the median. One unit had a score above the 75th percentile for shell; only two others had scores above the median. No units contained fcr.

308.42: 3 shovel tests, 8 excavation units. About half the units had scores above the 75th percentile for lithics, the others were above the median. Thwo-thirds of the units had values for shell that were above the 75th percentile, with the other above the median. All but three units contained fcr.

308.43: 0 shovel tests, 2 excavation units. This concentration was a small, less dense spatial cluster a bit detached from .42. Both units had lithic scores above the median, but shell scores below the median and no fcr.

308.51: 2 shovel tests, 3 excavation units. This concentration is a small, dense cluster of lithics, shell and fcr contained within a more diffuse concentration of lower-density scores. All but one unit had lithic scores above the 75th percentile. One unit had a score for shell above the 75th percentile and all the others were above the median. Two units contained large amounts of fcr.

308.52: 15 shovel tests, 0 excavation units. This concentration of moderately dense remains contained within it Concentration 308.51. All values were greater than the median for lithics and one was above the 75th percentile. One unit had a score above the median for shell, the others had less or no shell. One unit contained fcr.

308.61: 5 shovel tests, 0 excavation units. This was a discrete cluster of units with scores for shell above the median. No units had high scores for lithics. No units contained fcr.

308.71: 4 shovel tests, 4 excavation units. All units had values for lithics and/or shell that were greater than the 75th percentile. Three units contained fcr.

308.72: 13 shovel tests, 1 excavation unit. A large concentration that contained units with moderate scores. All units contained values for lithics and/or shell that were above the median. No units contained fcr.

323.11: 7 shovel tests, 0 excavation units. This concentration contained low to moderate scores. One unit had a score above the median for lithics, the remainder had scores below the median. Two units had scores for shell above the median, other units contained no shell. Two units contained fcr.

323.12: 7 shovel tests, 3 excavation units. This concentration had moderate and low scores for lithics and a complete range of

FIGURE 3.9 : 19BN323, looking from south at the site in the middle distance

FIGURE 3.10: 19BN323, looking from the west at 323.21, .22, .23 and Nauset Marsh in the distance

scores for shell. Three units had scores for lithics above the median, the remaining scores were below it. One score was above the 75th percentile for shell, three were above the median, the remainder below it. Three units contained fcr.

323.13: 3 shovel tests, 2 excavation units. This concentration encompassed the western half of a cluster of moderate scores for lithic density. Concentration 323.14 is the eastern half. All units had scores above the median for lithics. One unit had a score above the median for shell, all others had less shell. No units contained fcr.

323.14: 6 shovel tests, 2 excavation units. This concentration encompassed the eastern half of a spread of units with moderate scores for lithic density. Half the units had scores above the median for lithics, the other half had scores below the median. The scores for shell followed a similar pattern, half above the median and half below it. Three units contained fcr.

323.15: 5 shovel tests, 0 excavation units. This concentration encompassed a low lithic density area with only two high-moderate shell values. It separates the low-moderate density .10's concentrations from the high density .20's concentrations. No units had lithic scores above the median. One unit had a shell score above the 75th percentile, and one was above the median; all others were less. No units contained fcr.

323.21: 4 shovel tests, 3 excavation units. All but two units had lithic scores above the 75th percentile. Half of the units had shell scores above the 75th percentile; the remainder were above the median. One unit contained fcr.

323.22: 3 shovel tests, 6 excavation units. All but two units had scores above the 75th percentile for lithics and shell. One unit contained fcr.

323.23: 1 shovel test, 2 excavation units. All units had scores above the 75th percentile for lithics. Two of three had scores above the 75th percentile for shell. All three units contained fcr.

323.24: 0 shovel tests, 2 excavation units. Both units had scores above the median for lithics, and one was above the median for shell. Neither contained fcr.

Southern Side of Salt Pond, 19BN340, 19BN274/339, 19BN273/275, and 19BN341

These sites, found on flat slightly elevated land just south of Salt Pond, are a more or less continuous distribution of archeological remains (Foldout Map E). 19BN340 is located immediately adjacent to the salt marsh fringe of Nauset Marsh, mainly along a low flat ridge less than ten feet above sea level.

The other sites are set back from the marsh edge on slightly more elevated flat areas 20-40 feet above sea level. Site areas cover two to three acres each with 50-80% of these areas included within concentrations. The current vegetation ranges from open woodland to dense evergreen or shrubs (Figures 3.11 and 3.12). During the early 20th century a major part of this area was a golf course. A number of former sand traps and other modern features were identified during survey and site examination activities.

The following are brief descriptions of the concentrations in these four sites. The descriptions aim to summarize the reasons for which the concentrations were delimited. The sites are described in order south to north.

340.11: 5 shovel tests, 0 excavation units. One unit had a value for lithics above the 75th percentile, two others were above the median. No units contained shell. Two units contained fcr.

340.12: 5 shovel tests, 0 excavation units. Two units had scores above the 75th percentile for lithics. One unit contained shell. No units contained fcr.

340.13: 3 shovel tests, 3 excavation units. A concentration with mixed scores for lithics and shell. One unit contained a value above the 75th percentile for lithics; however, except for one, other lithics values were below the median. Three units contained shell values above the 75th percentile, one above the median, and the remaining two contained no shell. No units contained fcr.

340.21: 3 shovel tests, 1 excavation unit. Two units had scores above the 75th percentile for lithics; one value was above the median and the other below it. A similar pattern existed for shell values. One unit contained a slight amount of fcr.

340.22: 5 shovel tests, 2 excavation units. Half of the units had values greater than the 75th percentile for lithics, the other values were below the median for lithics. All but two units had scores for shell above the 75th percentile. No units contained fcr.

274/339.11: 2 shovel tests, 1 excavation unit. All units had scores between the 75th and the 25th percentiles for lithics. Scores for shell ranged from the 75th percentile to the median. One unit contained fcr.

274/339.12: 4 shovel tests, 10 excavation units. All units contained scores for lithics that ranged from above the 75th percentile to the median. Shell scores had the same pattern. Many of the units also contained fcr.

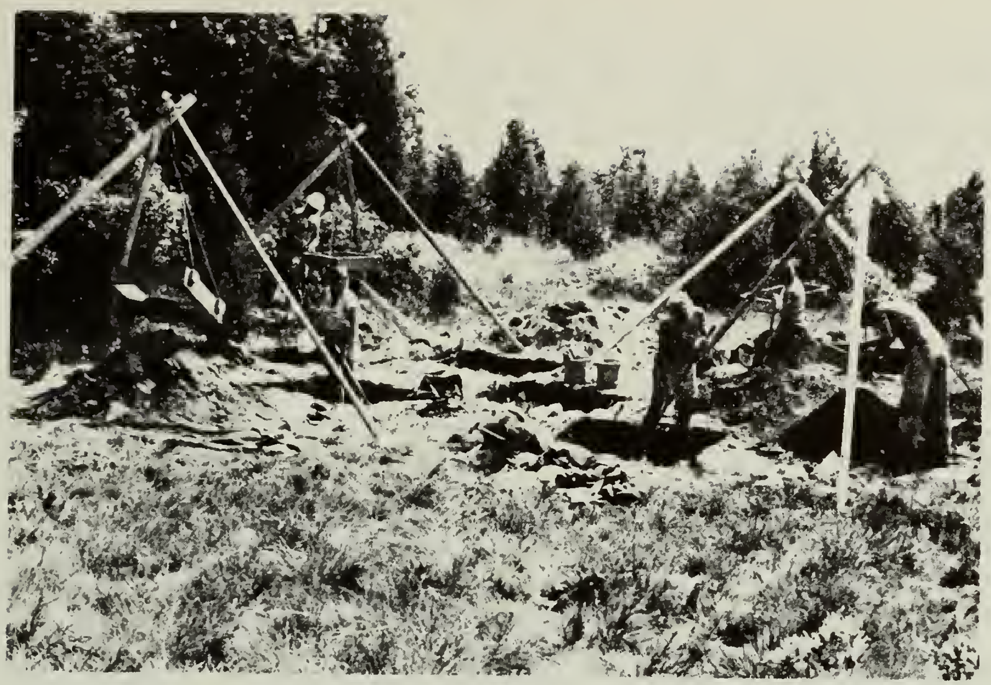


FIGURE 3.11: 19BN274/339, Concentration .12

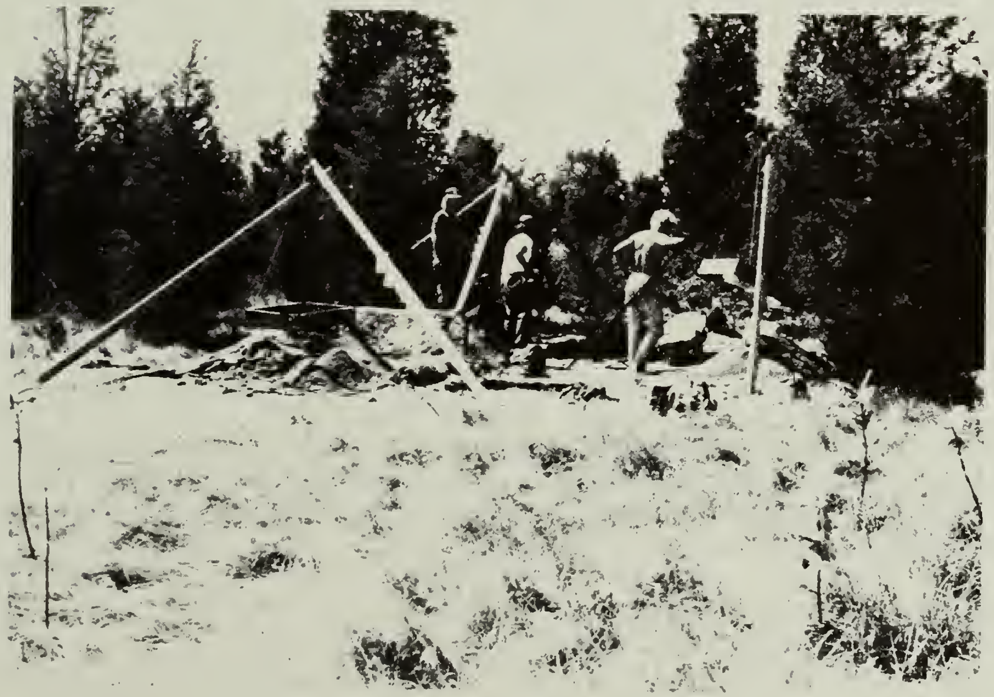


FIGURE 3.12: 19BN341

274/339.13: 1 shovel test, 2 excavation units. Most of the units had values above the 75th percentile for lithics and shell. Two of the units contained fcr.

274/339.21: 3 shovel tests, 0 excavation units. All units had scores above the 75th percentile for lithics. None of the units had shell values above the 25th percentile. No units contained fcr.

274/339.22: 4 shovel tests, 3 excavation units. All units had lithic values above the 75th percentile or between it and the median. The three units on the eastern edge had shell values above the median. One unit contained fcr.

274/339.31: 6 shovel tests, 5 excavation units. Lithic scores for units ranged from above the median to above the 25th percentile. Most units had scores for shell that were above the 75th percentile. Three units contained fcr.

274/339.32: 3 shovel tests, 0 excavation units. The scores for lithics ranged from above to below the 25th percentile, yet scores for shell all were above the 75th percentile. No units contained fcr.

274/339.41: 4 shovel tests, 0 excavation units. All units had scores ranging from above the median to above the 25th percentile for both lithics and shell. No units contained fcr.

273/275.11: 10 shovel tests, 0 excavation units. Half the units had scores above the 75th percentile for lithics; the remainder had lithic values above the median. Units had mixed densities of shell; one third were above the 75th percentile and half of the balance were above the median. One unit contained a small amount of fcr.

273/275.12: 5 shovel tests, 0 excavation units. Only one unit had a lithic score above the median. Two units had scores above the 75th percentile for shell. No units contained fcr.

273/275.13: 4 shovel tests, 0 excavation units. All units had values above the 75th percentile for lithics. Only one had a score above the median for shell. No units contained fcr.

273/275.31: 3 shovel tests, 4 excavation units. About half the units had scores above the 75th percentile for lithics. All units had scores above the 75th percentile for shell. One unit contained much fcr.

273/275.32: 3 shovel tests, 1 excavation unit. All units contained lithic scores above the 75th percentile. Only one contained shell with a score above the 75th percentile. No units contained fcr.

341.11: 6 shovel tests, 0 excavation units. This concentration had moderate density scores, with a pattern of scores and location more akin to 273/275.31 and .32, which are its immediate neighbors, than to other 19BN341 concentrations. All units contained scores above the median for lithics; one was above the 75th percentile. Only two units had shell values above the median. No units contained fcr.

341.21: 5 shovel tests, 3 excavation units. Half of the units had values above the 75th percentile for lithics. All but two units had values above the 75th percentile for shell. One unit contained fcr.

341.22: 7 shovel tests, 3 excavation units. A concentration with mixed scores and an eastern border with three high density concentrations: .21, .23 and .24. Half of the units had lithic scores above the 75th percentile, the remainder had scores above the median. Half the scores for shell were above the median and a third of the units contained fcr.

341.23: 3 shovel tests, 4 excavation units. Half of the units had values above the 75th percentile for lithics, the remainder were above the median. All but one unit were above the 75th percentile for shell. Two units contained fcr.

341.24: 2 shovel tests, 9 excavation units. All but one unit had lithic scores above the 75th percentile. The same pattern held for shell. All but one unit contained fcr.

341.25: 2 shovel tests, 2 excavation units. All but one unit had values above the median for lithics and two units had values for shell that were above the 75th percentile. No units contained fcr.

341.26: 2 shovel tests, 1 excavation unit. One unit had a score above the 75th percentile for lithics; the others had scores above the median. Two of the units had scores for shell that were above the 75th percentile. No unit contained fcr.

Northern Side of Salt Pond, 19BN288 and 19BN390

These sites are located in an area of undulating topography currently composed of open fields and woodlands that include dense evergreen stands (Foldout Map F). The Nauset Country Club Golf Course covered a portion of this area also during the early 20th century. 19BN288 covers approximately five acres, mainly along a ridge between a sharp incline to Nauset Bay on the south and a large kettle to the north. The archeological remains extend along the broad, flat top of the ridge and down its slopes, as well as partially around and into the kettle (Figure 3.14).

19BN390 covers a smaller area and is located in a wide swale that currently is an open woodland (Figures 3.15 and 3.16). The

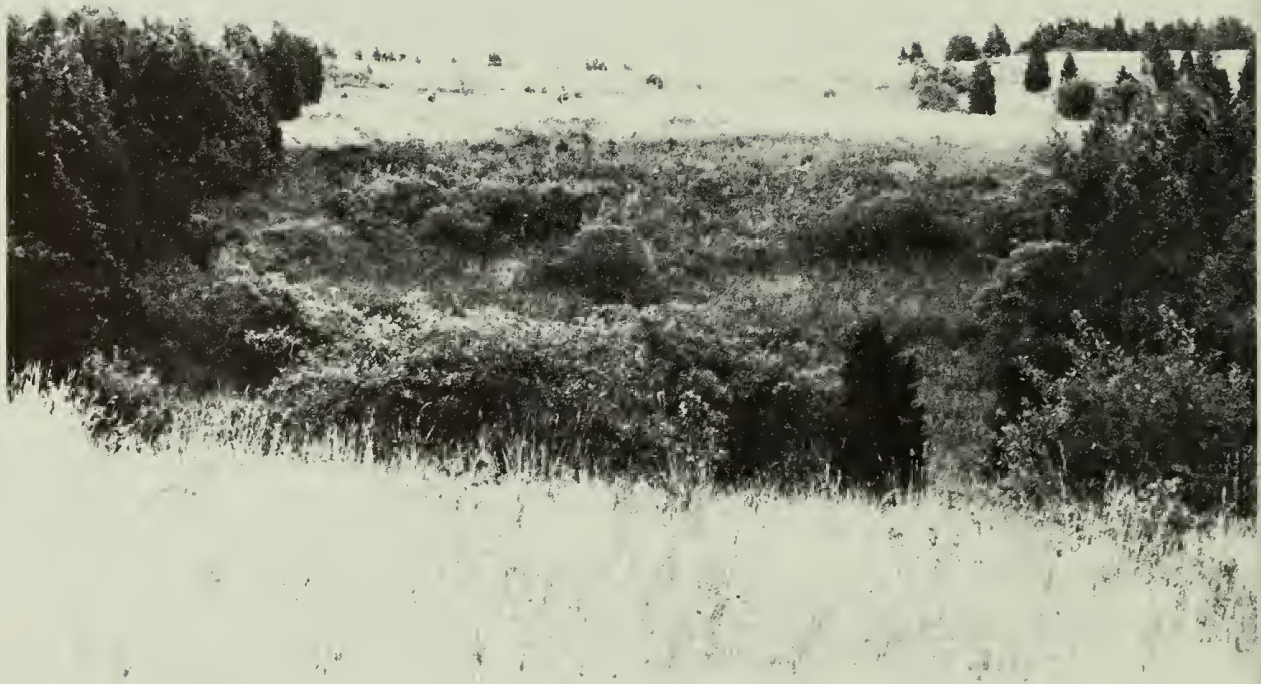


FIGURE 3.14: 19BN288 is located on the ridge in the middle distance, the kettle is in the foreground and Nauset Harbor is in the distance

following are brief descriptions of each concentration delimited in these sites.

288.11: 13 shovel tests, 2 excavation units. This concentration is a combination of two areas. The units in each had scores for lithics and shell from above the 75th percentile to above the median. In one area two units contained fcr, in the other only one unit did.

The .20's concentrations cover an area that slopes down from the relatively high density, level area in which the .30's concentrations were delimited.

288.21: 11 shovel tests, 1 excavation unit. This concentration is a low density area. All units had scores below the median for lithics, and only three had scores above the median for shell. No unit contained fcr.

288.22: 13 shovel tests, 0 excavation units. This is a spatially discrete concentration similar to 288.11. Density scores for lithics and shell ranged from above the 75th percentile to below the median. A few units contained fcr.

288.23: 5 shovel tests, 0 excavation units. This concentration had a moderate to low density for lithics with a high density for shell. All but two units had values above the median for lithics. All units had values above the 75th percentile for shell. No unit contained fcr.

All of the .30's concentrations had high densities for lithics and shell. They occupy an area that generally is flat to slightly eastward-sloping.

288.31: 12 shovel tests, 1 excavation unit. All but three units had lithic density values above the 75th percentile. Three quarters of units had values above the 75th percentile for shell. Three units contained fcr.

288.32: 9 shovel tests, 0 excavation units. All but one unit contained scores above the 75th percentile for lithics. All units had scores above the 75th percentile for shell. One unit contained fcr.

288.34: 5 shovel tests, 0 excavation units. This is a mixed lithic density concentration with little shell and no fcr on a slope running down to the bottom of the kettle. Two units had scores above the 75th percentile for lithics, one had a value above the median and the other two below it. Only one unit had any shell. No units contained fcr.

The .40's concentrations cover a high to moderate density area on the slopes north and south of the flat-topped ridge that runs through the eastern half of the site.

288.41: 5 shovel tests, 1 excavation unit. This concentration is on the lower slope and part of the bottom of the kettle. All units but one had values above the median for lithic densities. All units had values for shell above the median. One unit contained fcr.

288.42: 2 shovel tests, 2 excavation units. This concentration covers a slope between the flat ridge top and the kettle bottom. All units had scores above the 75th percentile for lithic density. All but one unit had values above the 75th percentile for shell. Two units contained fcr.

288.43: 6 shovel tests, 0 excavation units. This concentration is located on the upper slope between Nauset Bay and the flat ridgetop. All units but one had scores above the median for lithics. All units had scores above the 75th percentile for shell. No units contained fcr.

288.44: 7 shovel tests, 0 excavation units. This concentration is located on the slope of the kettle hole. Half of the units had scores above the median for lithics. All but one had values for shell above the median. No units contained fcr.

288.45: 9 shovel tests, 0 excavation units. This concentration in located on the southern side of the ridgetop and the upper slope between it and Nauset Bay. All units but one had scores above the 75th percentile for lithics and shell. Two units contained fcr.

The .50's concentrations cover a wide part of the flat-topped ridge in the western part of the site.

288.51: 9 shovel tests, 1 excavation unit. All but one unit had scores above the 75th percentile for lithics. Half of the units had scores above the 75th percentile for shell. Two units contained fcr.

288.52: 3 shovel tests, 4 excavation units. This concentration has a mixture of high and moderate density scores for lithics and shell. About half the units had scores above the 75th percentile for lithics and/or shell. Half of the units had scores above the median for one or both. One unit contained fcr.

288.53: 4 shovel tests, 1 excavation unit. All units but one had scores for lithic density above the 75th percentile. Two units had scores for shell density that were above the 75th percentile. All units contained fcr.

288.54: 7 shovel tests, 0 excavation units. All units but one had scores for lithic density above the 75th percentile. All units had scores for shell density either above the 75th percentile or above the median. No units contained fcr.

288.55: 11 shovel tests, 0 excavation units. All units but one had values above the 75th percentile for lithic density. All units but two had similar high values for shell density. One unit contained fcr.

288.56: 4 shovel tests, 0 excavation units. All units but one had values above the 75th percentile for lithic density. All units but two had similar high values for shell density. One unit contained fcr.

288.57: 6 shovel tests, 1 excavation unit. One unit had a score above the 75th percentile for lithic density, the other units had scores above the median. All but one unit had scores above the 75th percentile for shell. No units contained fcr.

288.58: 6 shovel tests, 0 excavation units. This concentration is a low density area for lithics with a low-moderate density for shell. All units had scores below the median for lithics. Two units had values below the median for shell. Two values were above the median and a single unit had a value for shell above the 75th percentile. No units contained fcr.

The .60's concentrations have moderate and low densities. They cover a portion of the site on the west and northwest slopes of the kettle and some of the bottom of the kettle, as well as a relatively flat area west of the kettle slope.

288.61: 6 shovel tests, 0 excavation units. All but one unit had scores for lithic density above the median. Only one unit had a score for shell density above the median. One unit contained fcr.

288.62: 10 shovel tests, 0 excavation units. All units had scores below the median for lithic density. All but one unit had scores below the median for shell density. No units contained fcr.

288.63: 10 shovel tests, 1 excavation unit. This concentration covers part of the bottom and slope of the kettle. All but one unit had scores above the median for lithic density, one was above the 75th percentile. All units had values below the median for shell density. No units contained fcr.

A larger proportion of the units within 19BN390 contained fcr than was the case with many of the sites described already. For concentrations in this site fcr scores above the 75th percentile are described as high scores; lower scores are also noted.

390.11: 6 shovel tests, 0 excavation units. All units had low-medium density values for lithics. Only two units contained shell, albeit at values above the 75th percentile. Two units contained high fcr scores.

FIGURE 3.15: 19BN390, looking from the west into the swale

FIGURE 3.16: Looking at the area of Concentration 390.33 from the west

390.12: 7 shovel tests, 0 excavation units. Units had high-to-medium values for lithic density. Only one unit contained shell. No units contained fcr.

390.21: 9 shovel tests, 0 excavation units. Units in this concentration had high-to-medium densities for lithics. Two adjacent units contained shell. Two adjacent units contained high scores for fcr.

390.22: 13 shovel tests, 1 excavation unit. This concentration is adjacent to 390.21, and its lithic, shell and fcr densities are the same. The shell and fcr distributions are contiguous with those in 390.21.

390.23: 4 shovel tests, 0 excavation units. This concentration is an area of low lithic density that separates the .20's and .30's concentrations. All units had low scores for lithic density. Scores for shell density were high, all above the 75th percentile. Two units contained high fcr scores.

390.31: 12 shovel tests, 0 excavation units. Units had high-to-medium scores for lithic densities. Some units in the western part of the concentration had scores above the 75th percentile for shell densities. Units in the southern, central and northeastern parts of the concentration contained fcr.

390.32: 7 shovel tests, 0 excavation units. This concentration is a small area of medium-to-low lithic density separating concentrations .31 and .36. Units had low scores for shell density. No units contained fcr.

390.33: 7 shovel tests, 5 excavation units. Units had high-to-medium scores for lithic density. Most of the units had shell scores above the 75th percentile. Some units had high fcr scores.

390.34: 7 shovel tests, 1 excavation unit. Units had high scores for lithic density. Most units had high scores for shell density. Three units contained high values for fcr.

390.35: 11 shovel tests, 1 excavation unit. Units had high-to-medium scores for lithic density. A few units had low scores for shell density, others contained no shell. Two units had moderate scores for fcr.

390.36: 9 shovel tests, 0 excavation units. Units had high-to-medium scores for lithic densities. Only two units had shell and these scores were low. Four scattered units contained fcr.

390.37: 9 shovel tests, 1 excavation unit. Units had scores of high, medium and low lithic densities. Shell occurred in only two units and in small amounts. Several units in the west and center of the concentration contained fcr.

Northern Side of Nauset Marsh, 19BN333, 19BN336 and 19BN337

These are three small sites near the northern shore of Nauset Marsh, 20-30 feet above sea level (Foldout Map G). Preliminary analysis of 1979 and 1980 survey interpreted these sites as representing a variety of activities and moderate-length occupations (McManamon 1982:16). During the 1981 field season additional site examination was carried out there for data collection to refine the rough intial interpretation. Seven concentrations have been delimited, mainly set back on flat land 50-150 m from the sharp slope along the shore of Nauset Marsh. The modern vegetation ranges from open fields that occur north of the paved road shown on Foldout Map G to dense shrubs and woods south of the road and nearer to the water.

19BN333 contains the lowest scores for lithics and shell of any of these three sites.

333.11: 4 shovel tests, 4 excavation units. This concentration borders the cliff along the shore of the marsh. Most units had scores above the 75th percentile for lithic density. Half the units had scores below the median for shell. No units contained fcr.

333.12: 4 shovel tests, 0 excavation units. All units had scores for lithics above the median. Two units had scores above the 75th percentile for shell. No units had fcr.

19BN336 has the highest scores for lithics/qcm among these three sites.

336.11: 5 shovel tests, 1 excavation unit. All units had high scores for both lithic and shell densities. The high density lithic distribution is spatiallydistinct from the shell. No units contained fcr.

336.12: 2 shovel tests, 3 excavation units. All units had high-medium scores for both lithic and shell densities. No units contained fcr.

336.13: 3 shovel tests, 0 excavation units. All units had low scores for both lithic and shell densities. Two units contained fcr. This concentration is a low density area between 336.11, 336.12, and 336.14.

336.14: 3 shovel tests, 4 excavation units. All units had high-medium scores for lithic and shell densities. Three units contained fcr.

337.11: 3 shovel tests, 5 excavation units. All units had high-medium scores for lithic and shell densities. No units contained fcr.

Coast Guard Beach Area, 19BN374

This site was discovered and examined during the 1979 field season. Archeological deposits cover virtually the entire area of this hill which rises 20-30 feet above sea level. Ocean and marsh surround it on most of three sides. It is at the base of the southward-projecting spit of Nauset Beach. Gently sloping or undulating ground covers most of the hill, which on its eastern side also includes a kettle hole pond now half-filled by a marsh (Foldout Map H). The current vegetation ranges from the mowed lawn around the old Coast Guard station to dense shrubs and thickets on the northern end of the hill (Figure 3.17).

The site was intensively examined in 1980 and 1982 as part of an environmental impact study for a new roadway that will run through it (McManamon and Borstel 1981; Borstel 1983).

Shell occurred in the archeological deposits at this site; however, its density was far below any other site at Nauset. It was so infrequent and diffuse as to have no effect on subsequent analysis and is not included in the descriptions below. It is possible that the shell in this area was spread by historic period farmers as a soil fertilizer.

374.11: 0 shovel tests, 4 excavation units. This is a small concentration spatially isolated near the northern border of the site. All but one unit had values greater than the 75th percentile for lithics. No units contained fcr.

374.21: 10 shovel tests, 4 excavation units. All units had scores above the median for lithic density. Four units contained fcr.

374.22: 3 shovel tests, 0 excavation units. A small concentration that had mixed scores for lithics density, one above the 75th percentile, one above the median and one below the median. No units contained fcr.

374.23: 9 shovel tests, 0 excavation units. Two units had scores above the 75th percentile for lithic density, the other scores were below it. No units contained fcr.

Both .30's concentrations contain consistently high scores for lithic density, unlike the more mixed values of the other concentrations described so far.

374.31: 5 shovel tests, 1 excavation unit. The surface of this concentration had been disturbed by construction of a modern driveway. All but two units had scores above the 75th percentile for lithic density. No units contained fcr.

374.32: 6 shovel tests, 0 excavation units. All but one unit had scores above the 75th percentile for lithic density. No units contained fcr.

374.41: 7 shovel tests, 0 excavation units. Units included a mixture of scores for lithic density from high to low. No units contained fcr.

374.43: 5 shovel tests, 4 excavation units. Half the units had values above the 75th percentile for lithic density, the other half had scores above the median. No units contained fcr.

374.44: 12 shovel tests, 4 excavation units. Half the units had values above the 75th percentile for lithic density, the other half had scores above the median. No units contained fcr.

374.45: 12 shovel tests, 4 excavation units. One quarter of units had values above the 75th percentile for lithic density; the remainder had values above the median. No units contained fcr.

374.46: 13 shovel tests, 4 excavation units. Half of the units had scores above the 75th percentile for lithics, the other scores were mainly above the median. No units contained fcr.

374.47: 6 shovel tests, 0 excavation units. One unit had a value above the 75th percentile for lithic density, another had a value below the median. The remainder of the scores for lithic density were above the median. No units contained fcr.

The .50's concentrations are mainly located on a steep-to-moderate slope. Individual concentrations of this group are linear and perpendicular to the slope.

374.51: 8 shovel tests, 1 excavation unit. One unit had a score above the 75th percentile for lithic density. All the other units except three had scores below the median. No units contained fcr.

374.52: 11 shovel tests, 0 excavation units. Half the units had values above the median for lithic density; half the units had values below the median. No units contained fcr.

374.53: 3 shovel tests, 0 excavation units. This concentration is located at the base of a slope. All three units contained scores well over the 75th percentile for lithic density. No units contained fcr.

374.54: 7 shovel tests, 4 excavation units. All but two units had scores above the 75th percentile for lithic density. No units contained fcr.

374.55: 10 shovel tests, 0 excavation units. All but two units had scores above the 75th percentile for lithic density. No units contained fcr.

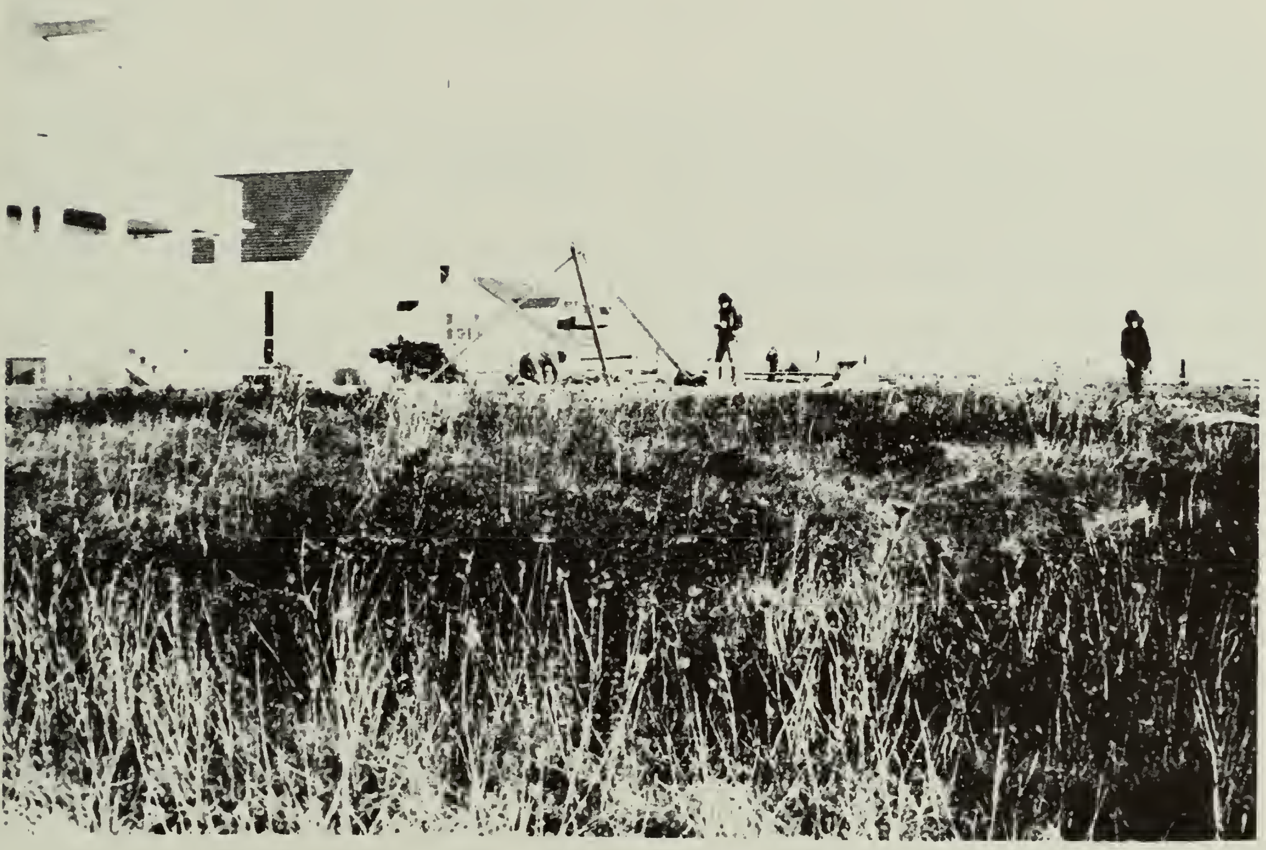


FIGURE 3.17: Location of Concentration 374.63 in southeastern part of 19BN374

374.56: 8 shovel tests, 0 excavation units. All but two units had scores above the 75th percentile for lithic density. No units contained fcr.

374.57: 3 shovel tests, 0 excavation units. Two units had scores above the 75th percentile, and one had a value above the median, for lithic density. No units contained fcr.

The .60's concentrations are located in the southeastern corner of the site, in an area now covered by a lawn (Figure 3.21).

374.61: 7 shovel tests, 0 excavation units. Two units had scores above the 75th percentile for lithic density. The remaining scores were above the median. No units contained fcr.

374.62: 9 shovel tests, 0 excavation units. All but one unit had scores above the median for lithic density. No units contained fcr.

374.63: 10 shovel tests, 0 excavation units. This concentration contained mixed scores for lithic density. About half the units had values above the 75th percentile. Of the others, roughly half had scores above and half below the median for lithic density. No units contained fcr.

Concentrations 374.71 and 374.81 are located in the southwestern corner of the site.

374.71: 10 shovel tests, 0 excavation units. This concentration contained mixed scores for lithic density. About half the units had values above the 75th percentile. Of the others, roughly half had scores above and half below the median for lithic density. No units contained fcr.

374.81: 8 shovel tests, 0 excavation units. This concentration also contained mixed scores for lithic density. Again, about half the units had values above the 75th percentile. Of the others, roughly half had scores above and half below the median for lithic density. No units contained fcr.

The sites and concentrations just described are located in the Nauset portion of the study area. The sites described in the following sections are in the High Head portion of the study area (see Figures 3.1 and 3.3 and Foldout Map C). In general the microenvironments where they occur are quite different from those of the sites described above. Even the sites at High Head that are within sight of the Atlantic Ocean or Cape Cod Bay have much more of an inland or upland than a coastal appearance. The archeological remains also reflect less involvement with coastal resources. Except for 19BN169, which in fact is not in the upland portion of this area, little or no shell or fish remains were found in any of the sites. Faunal and floral remains were very rare in all of these sites, although differential preservation rather than prehistoric activities might account for this rarity.

Truro Wetlands, 19BN355 and 19BN356

These sites are located around a freshwater wetland in North Truro at the southern end of what is referred to here as the High Head area (Foldout Map J). These are the only prehistoric sites of any size that were discovered in sampling stratum IC. The area is currently covered by a mixture of open grassland, shrubs and thickets (Figure 3.18). The concentrations in the southern end of the site have been disturbed a bit by the construction and use of a sand road. Artifacts from these concentrations sometimes appear on the margins of this roadway. Illicit collecting of artifacts seems to have occurred along this roadway during the recent past.

355.11: 5 shovel tests, 1 excavation unit. This concentration covers a relatively flat area adjacent to the wetland edge. Half of the units had high values for lithic densities and half medium scores. One unit contained fcr.

355.12: 4 shovel tests, 1 excavation unit. This concentration covers a relatively flat area adjacent to the wetland edge. Half of the units had high values for lithic densities and half medium scores. One unit contained fcr.

355.21: 4 shovel tests, 1 excavation unit. This concentration is located on an incline sloping to the west into a kettle hole just north of 355.11 and 355.12. Most units had high or medium scores for lithic densities. One unit contained fcr.

356.11: 4 shovel tests, 1 excavation unit. This concentration extends along a flat area at the northern edge of the kettle hole. All units had values above either the 75th percentile or the median for lithic density. No units contained fcr.

356.12: 1 shovel test, 1 excavation unit. Both units had scores above the 75th percentile for lithic density. Both units contained fcr.

356.21: 0 shovel tests, 5 excavation units. This concentration is on a slight incline upslope from 355.21. All units had values above the 75th percentile for lithic densities. Three units contained fcr.

High Head East, 19BN169 and 19BN282/283/284

These sites were discovered in one of the first sample units completed during the 1979 field season. 19BN282/3/4 also was examined more intensively during the 1981 field season. 19BN169 is located adjacent to a wetland at the base of the cliff that

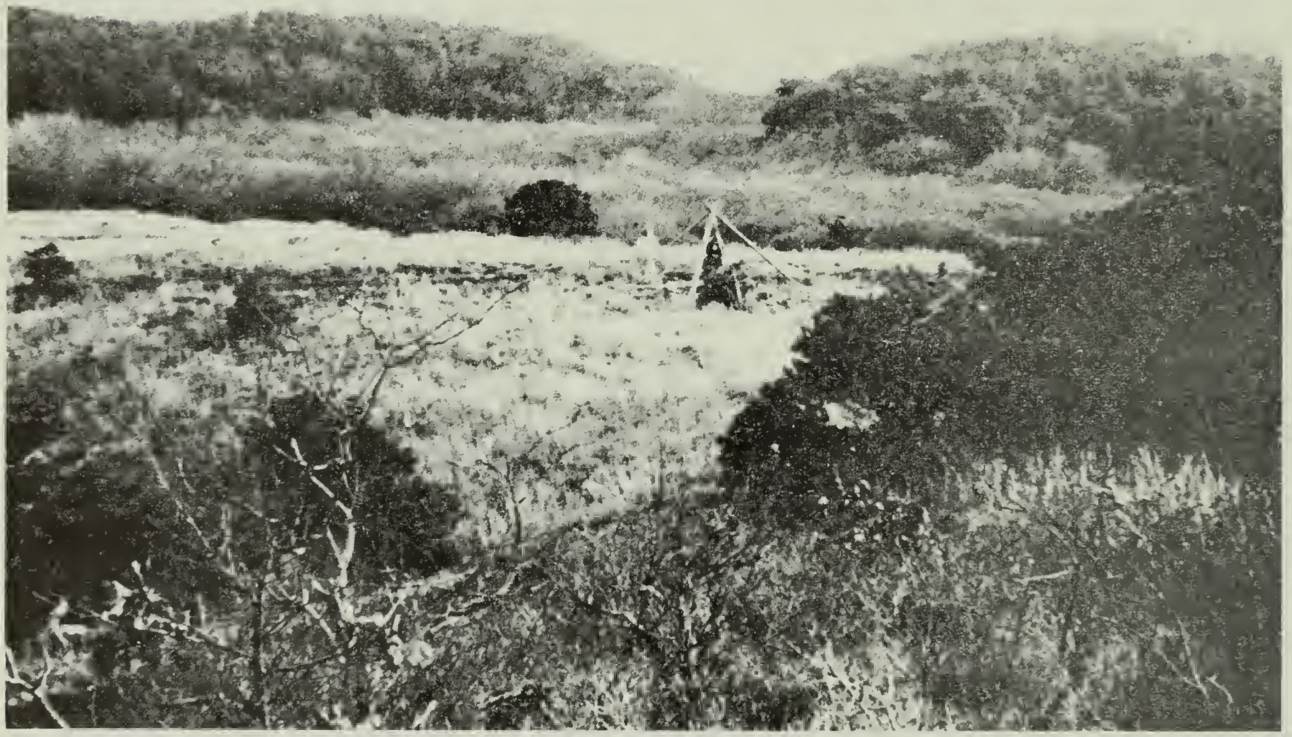


FIGURE 3.18: 19BN355 and 19BN356

separates the top of the outwash plain deposits, about 60 feet above sea level, from the Salt Meadow at sea level (Foldout Map K). The vegetation near the wetland is a mixture of open field and dense thickets or woods. At the top of the cliff lies 19BN282/3/4 in an open woodland with some patches of dense thickets (Figures 3.19 and 3.20).

Of all the sites described in this section, only 19BN169 contains substantial shellfish remains. The values for shell will be included in the descriptions of 19BN169 concentrations, but not for any other sites.

169.11: 4 shovel tests, 0 excavation units. Units had scores that were high, medium and low for lithic density. All values for shell were above the median. One unit contained fcr.

169.21: 3 shovel tests, 0 excavation units. Units had high scores for lithic density. No units had shell or fcr.

169.22: 6 shovel tests, 0 excavation units. Units had high, medium and low scores for lithic and shell densities. Four units had fcr.

169.23: 2 shovel tests, 0 excavation units. Neither unit contained lithics. Both units had medium shell densities. No units contained fcr.

19BN282/3/4 covers an area directly up the former marine scarp from 19BN169. Neither this site nor 19BN281, which is described following it, contains substantial shell. The descriptions for concentrations, therefore, ignore any occurrence of shell.

282.11: 5 shovel tests, 0 excavation units. Units had lithic scores that mainly were high-medium. One unit contained fcr.

282.12: 6 shovel tests, 1 excavation unit. Units had lithic scores that mainly were high-medium. One unit contained fcr.

The .20's concentrations cover a high lithic density area in the center of the site. A smaller high density fcr area occurs within the high lithics area.

282.21: 4 shovel tests, 0 excavation units. Units had high scores for lithic density. No units contained fcr.

282.22: 4 shovel tests, 1 excavation unit. All but one or two units had high scores for lithic density and contained fcr.

282.23: 3 shovel tests, 5 excavation units. All but one or two units had high scores for lithic density and contained fcr.

282.24: 2 shovel tests, 5 excavation units. All but one or two units had high scores for lithic density and contained fcr.

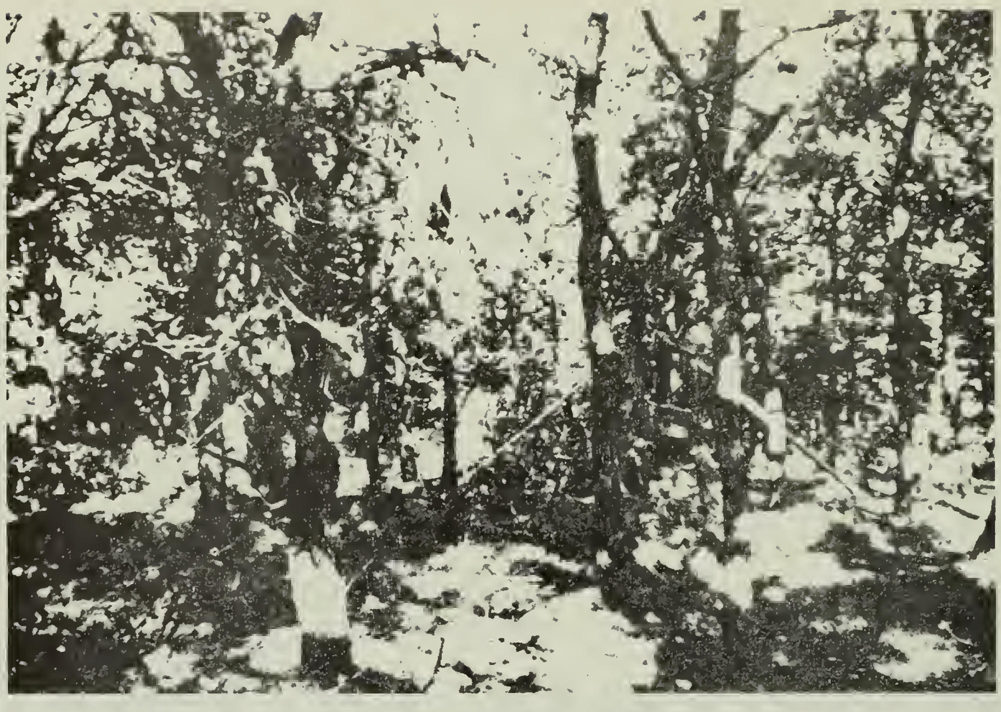


FIGURE 3.19: 19BN282/3/4

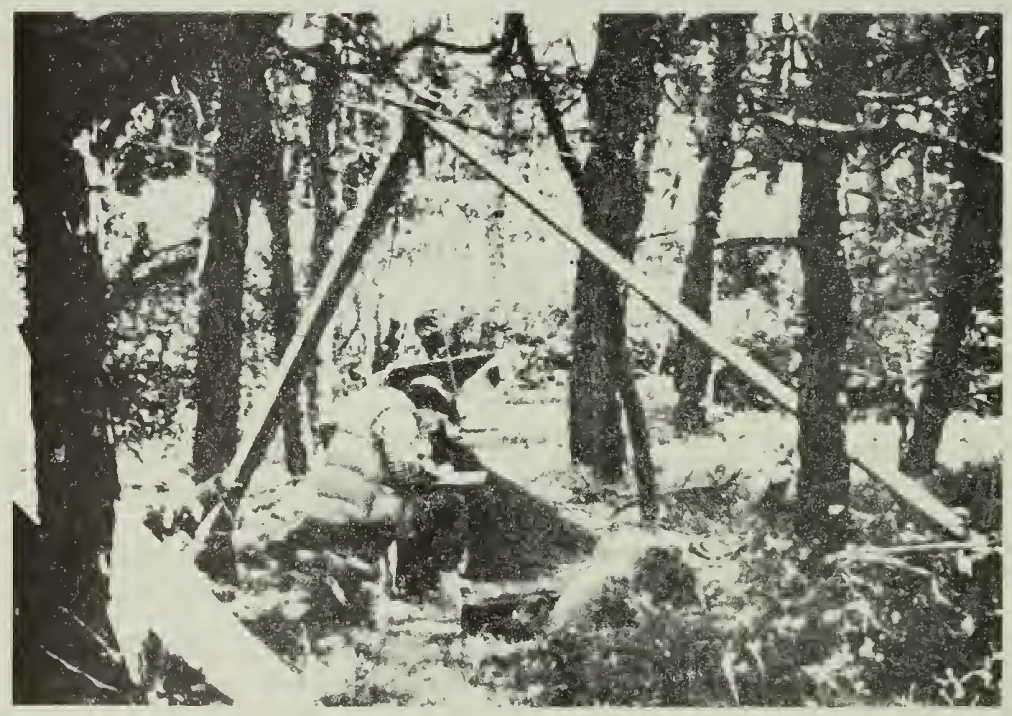


FIGURE 3.20: 19BN282/3/4

282.31: 9 shovel tests, 0 excavation units. Units had low scores for lithic density. One unit contained fcr.

282.41: 6 shovel tests, 1 excavation unit. All but one unit had high or medium values for lithic density. No units contained fcr.

High Head West, 19BN281

19BN281 is an anomaly in many ways. It is the only prehistoric site of any substance that was discovered in the original sample stratum II, and the results of site examination there in 1980 were the catalyst for the redefinition of the sample stratification to identify a separate High Head sampling stratum. The occurrence of fcr within it is far more frequent and density values for fcr are much higher than at other sites. Values for lithics/qcm tend to be higher than in other sites. This makes for a more widespread distribution of high scores for both lithics/qcm and fcr/qcm. This also means that medium and low scores within 19BN281 are equivalent to scores ranked higher at other sites. Because of this and the other anomalous characteristics of this site, concentrations were delimited in low and medium-low density areas as well as in the medium and high density parts of the site.

The spatial pattern at 19BN281 contains fewer sharp breaks in lithic density levels than at other sites, so the concentration boundaries were drawn in a number of instances on the basis of the proximity of units rather than differences in scores (Foldout Map L). Virtually all excavation units listed below were 50 x 50 cm, a quarter to a sixth the size of most excavation units at other sites.

The site covers a gently rolling terrain with a few filled-in kettle holes. The area is covered mainly by long grasses, with patches of thick shrub and occasionally small evergreen trees (Figure 3.21).

The .10's concentrations are in the northeast corner of the site. They cover two large fingers of high lithic density scores.

281.11: 0 shovel tests, 3 excavation units. Units had either high or medium scores for lithic density. No units contained fcr.

281.12: 2 shovel tests, 5 excavation units. Half of the units had scores above the 75th percentile for lithic density, the other half were above the median. No units contained fcr.

281.13: 1 shovel test, 5 excavation units. All but one unit had high scores for lithic density, and all but two contained fcr.

281.14: 1 shovel test, 5 excavation units. All but one unit had high scores for lithic density, and all but three contained fcr.

281.15: 0 shovel tests, 1 excavation unit. Units had high and medium scores for lithic density. One unit contained fcr.

The .20's concentrations cover an area along the northern border of the site. The area is characterized by medium-to-low scores for lithic densities with spotty high scores for fcr.

281.21: 2 shovel tests, 3 excavation units. All units had low scores for lithic density. No units contained fcr.

281.22: 1 shovel test, 2 excavation units. Two units had scores above the 75th percentile for lithic density. The other had a score below the median, but was the only unit with fcr.

281.23: 3 shovel tests, 5 excavation units. All units had scores above the median for lithic density. No units contained fcr.

281.24: 4 shovel tests, 4 excavation units. This concentration is along the northern boundary of the median contour for lithic density. Only one unit contained fcr.

281.25: 1 shovel tests, 3 excavation units. This concentration is also along the northern boundary of the median contour for lithic density. Only one unit contained fcr.

281.26: 9 shovel tests, 0 excavation units. This is a large, low lithic density area just west of a kettle hole. A few units contained fcr.

The .30's concentrations center on a large high lithic density area (281.33), covering as well the medium and low density areas around it.

281.31: 4 shovel tests, 5 excavation units. Units had medium scores for lithic density. Two units contained fcr.

281.32: 2 shovel tests, 2 excavation units. Units had medium scores for lithic density. No units contained fcr.

281.33: 4 shovel tests, 9 excavation units. Most units had high scores for lithic densities. Two contiguous units contained fcr.

281.34: 2 shovel tests, 5 excavation units. Units had high or medium scores for lithic density. Three contiguous units contained fcr.

281.35: 2 shovel tests, 9 excavation units. All units had low scores for lithic densities. No units contained fcr.

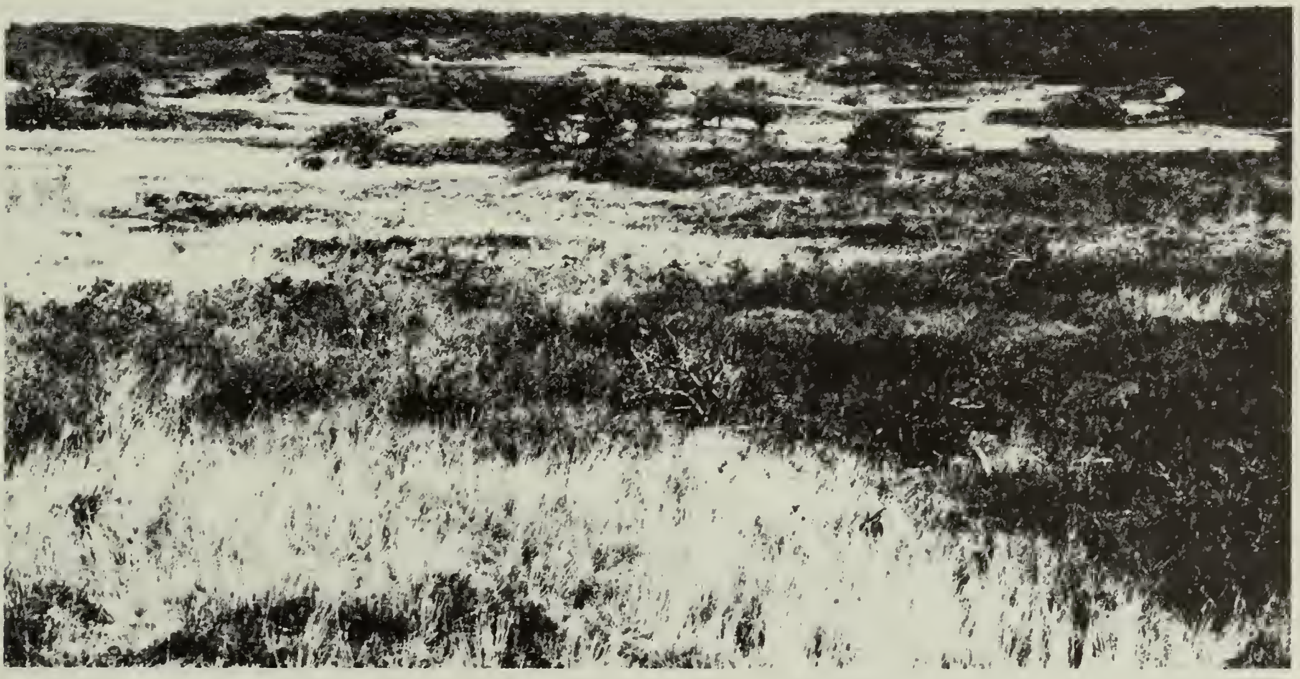


FIGURE 3.21: 19BN281

281.36: 2 shovel tests, 4 excavation units. Units had medium or low scores for lithic densities. One unit contained fcr.

281.37: 1 shovel test, 6 excavation units. Units had medium or low scores for lithic densities. One unit contained fcr.

281.38: 2 shovel tests, 3 excavation units. Units had low scores for lithic densities. One unit contained fcr. This concentration separates 281.33 from the large high lithic density area in the middle of the site.

281.39: 1 shovel test, 8 excavation units. Units had medium or low scores for lithic densities. No units contained fcr.

The .40's concentrations cover a large high lithic density area in the central and western parts of the site. This area also is covered by a high density of fcr. The two distributions overlap substantially, but not exactly.

281.41: 2 shovel tests, 5 excavation units. Almost all units had high scores for lithic and fcr densities.

281.42: 1 shovel test, 3 excavation units. Almost all units had high scores for lithic and fcr densities.

281.43: 1 shovel test, 3 excavation units. Almost all units had high scores for lithic and fcr densities.

281.45: 3 shovel tests, 6 excavation units. This concentration is on the southern central boundary of the high density lithic and fcr area. Most units had high scores for both.

281.46: 1 shovel test, 5 excavation units. This concentration is on the southwestern tip of the high density area. Many of the units had high scores for either lithic density, fcr density, or both.

281.47: 0 shovel tests, 5 excavation units. This concentration is in the northwestern section of the high lithic density area and along the border of the high fcr density area. Most units had high scores for lithic density. Some units contained fcr.

281.48: 1 shovel test, 6 excavation units. Most units had high scores for lithic density. Only one unit contained fcr.

Summary

This chapter has described 177 concentrations in 17 sites in two general areas, Nauset and High Head. The intent in delimiting concentrations was to distinguish those areas where artifacts and other archeological remains aggregated. Such spatial concentrations often are the residue of activities, such as tool manufacturing or repair, food processing, trash disposal or some combination of activities. Some activities, of course, did not cause substantial loss, discard, or dumping of remains; the method applied here identifies such areas as external to concentrations. On the other hand, for areas where loss, discard or dumping occurred, higher densities of remains are expected. These areas were identified using contour lines based upon the order statistics of the distribution of values for the density of remains. Subsequent stages of this analysis required artifacts, shell, fire-cracked rock and other remains in order to investigate chronology, function, seasonality and spatial variation. It was necessary, therefore, to identify areas where remains concentrated, rather than to focus on areas where activities that left few remains might have ocurred.

The following rules were applied generally to delimit concentrations:

(1) delimit areas with highest density (i.e., greater than or equal to the 75th percentile value) of lithics/qcm, shell/qcm or both;

(2) delimit areas with moderate density (i.e., values between the median and the 75th percentile) of lithics/qcm, shell/qcm or both;

(3) where necessary due to spatial proximity of units with different densities or natural topography, delimit concentrations with a mixture of densities;

(4) where large contiguous areas of high or moderate densities existed, subdivide them into smaller concentrations; base divisions upon the spatial proximity of field test units, natural topography, and presence or absence of high fire-cracked rock values when available; if analysis of contents and structure indicates these divisions are unjustified, combine them into single concentrations.

The concentrations are important for most of the analysis presented in subsequent chapters. They, rather than the sites of which they are parts, are the units of analysis. Succeeding chapters will describe the depositional, chronological, cultural, and functional characteristics that can be inferred about these units.

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CHAPTER 4

THE NATURAL ENVIROMENT AND NATURAL RESOURCES

Francis P. McManamon and Christopher L. Borstel

Introduction

This chapter presents a brief description of the natural environment of outer Cape Cod as it probably existed prehistorically. It is a description designed to give readers a general understanding of the prehistoric natural environmental context, rather than a detailed environmental reconstruction. Recently, detailed reconstructions of various past environments have been developed and used to test the appropriateness of economic or ecological models for predicting prehistoric subsistence strategies (e.g., Jochim 1976; Keene 1981; Perlman 1977). Such a reconstruction and test may be possible for the outer Cape, but is not attempted in this chapter.

Prehistoric archeological site locations on the outer Cape correlate with certain natural environmental characteristics. This is apparent from the large number of sites clustered in the area around Nauset Marsh, at northern High Head and the Pilgrim Spring area, around Wellfleet Harbor, and near the mouths of the Pamet and Little Pamet rivers. The dearth of sites in the large area that separates these site clusters indicates a strong negative correlation of site locations with areas away from protected embayments and estuaries. The extent to which these correlations are caused by the human exploitation of specific resources or resource combinations is not explored here. At this point in the analysis, faunal and floral remains recovered from archeological context indicate exploitation of a wide variety of subsistence resources (see Chapters 10, 11, and 16). This pattern echos the one observed by Ritchie (1969) in the prehistoric middens of Martha's Vineyard (see Chapter 5). At present, the temporal variation in subsistence practices is known only generally, although additional comparisons of the remains from proveniences dated to different time periods is likely to improve our understanding of such variation if it occurred.

Further analysis of the prehistoric natural environment as well as detailed models of human exploitation of it probably could be profitably pursued with the outer Cape as a focus. The wealth of data from the survey on the locations, frequencies, and characteristics of archeological resources constitutes an excellent data base with which to test a rigorously constructed model similar to those developed by Jochim (1976) and Keene (1977) for temparate forest environments.

The following sections of this chapter are designed to provide readers with a general familiarity of the development of geomorphology, hydrology, and vegetation patterns of the outer Cape. Several microenvironment types are described along with some of the resources associated with them that might have been used by prehistoric human groups. Since this is a generalized and brief presentation, readers are advised to consult references cited for details and fuller discussions of specific topics.

Geology, Soils, and Geomorphology

Cape Cod is a complex of late Wisconsin glacial landforms that has been modified primarily by sea level rise and marine erosion. The Cape and the surrounding seafloor rest on Precambrian and Paleozoic crystalline basement rocks. These rocks occur beneath the Cape at depths of 50 m to 275 m. below sea level (Oldale 1969: Figure 1). Overlying the basement complex are unconsolidated Cretaceous to Eocene coastal plain deposits that form a broad topographic high, largely below sea level. Quaternary period glacial drift and marine sediments cap this platform (Zeigler et al. 1964: 706-708, 1965: R302). The coastal plain deposits and crystalline basement rocks are the primary sources for the sediments composing the drift (Oldale 1976:16).

The outwash plains making up the majority of the outer Cape are the product of a rapid series of events that occurred between 15,000 and 14,000 years ago (Oldale, Koteff, and Hartshorn 1971). Within three millenia of deglaciation, Cape Cod's landscape had stabilized, and by 11,300 BP a boreal forest covered the area (pollen subzone lb at Duck Pond, Wellfleet--Winkler 1982:53-54). Sea level rise (Oldale and O'Hara 1980) encouraged erosion of the glacial drift and drowned the coastline. Some of the eroded sediments were transported northward to build the Provincelands Hook, beginning about 6,000 years ago (Zeigler et al. 1965: R307).

The outwash plains which extend south of High Head are predominantly sand with some gravel, cobbles, and boulders intermixed. Occasional lenses of glaciolacustrine clayey silt are scattered through the outwash. The Provincelands, north of High Head, are composed of sandy marine deposits, capped by wind-formed dunes with heights as great as 30 m. Both the glacial drift and the aeolian and marine deposits are generally very permeable, so precipitation readily percolates through the soil to the water table, located just above sea level (Strahler 1966: 73-76). Sea level is responsible in large part for the heights of water levels in freshwater ponds, wetlands, and steams although Duck Pond, in its early development, appears to be an exception to this (Winkler 1982). Leatherman (1979) contains a host of descriptions and analyses of the geomorphology of the outer Cape in general, as well as for specific locations.

Moderately developed podzolic soils have formed in these deep, sandy Quaternary deposits. Soils formed on moderately to excessively drained parent material cover about 60% of the non-tidal lands in the Seashore (5627 ha of 9302 ha--Soil Conservation Service 1980: Table 1). Sandy soils with little or no profile development, and unstabilized dunes sands cover another 29% (2728 ha) of the non-tidal Seashore land, mostly in the Provincelands. Only areas close to sea level are reached by the water table, so freshwater mucks and waterlogged soils cover a minor 8% (757 ha) of the Seashore's non-tidal lands.

The Soil Conservation Service (1980) has classified nearly all (5480 ha in the Seashore) of the non-wetland soils on the outwash plains as Carver series. This series consists of deep, excessively drained, acidic (pH 3.6-6.0) soils. Typically surface and subsurface horizens have course sand, loamy sand, or loamy coarse sand textures. These soils are considered to have a low susceptibility to erosion by water and a low potential for forest heaving (Soil Conservation Service 1980: 16 and Table 1; 1982). Although classified as Entisols, implying no natural profile development, some podzolization has taken place and soil horizons are generally present in these soils (Strahler 1966: 91-93). Nearly all of the prehistoric sites the survey has discovered are on Carver coarse sandy soils.

Site 19BN374 is one of the few sites located on another soil type, the Merrimac series. These are sandy, acidic (pH 3.6-6.0) soils with light-colored surface horizons. They are deep and somewhat excessively drained. "Merrimac soils have a fine sandy loam surface soil and a sandy loam subsoil (Soil Conservation Service 1980: 17)". These soils are rated as moderately subject to water erosion on slopes of 3% or more and as having a low potential for frost action (Soil Conservation Service 1980: Table 1). Although soils at Coast Guard are classified in a different series from most other portions of the outwash plains (Merrimac fine sandy loams cover only 32 ha of the Seashore), horizon development and texture in archeological profiles at 19BN374 appear to differ little from other Nauset area sites.

Since the land surface stabilized following deglaciation two major geomorphic zones have dominated the outer Cape: the shore zone and the upland zone. The shore zone includes those areas below the high tide line, as well as adjacent areas above it that are directly influenced by shoreline processes. The upland zone includes the land beyond the reach of the unstable dunes and tide.

The boundary between the two zones is dynamic. In general, the upland zone has lost land area to the shore zone. Coastal retreat has been rapid along most sections of the marine scarp (erosion averages .79m/yr on the ocean side --Zeigler et al. 1964). In protected areas the shore zone advances primarily through sea level rise, but sea level rise may be offset by spit and barrier beach development. The Provincelands illustrate multiple shifts between the two geomorphic zones. Initially the area developed as a spit with dunes (Zeigler et al. 1965) and was in the shore zone. As the spit built to the northwest, vegetation stabilized the dunes, and the active geomorphic processes became largely upland in nature. Colonial period cutting of the forests destabilized the dunes (McCaffrey and Leatherman 1979) and shore zone processes once more came to dominate. Restabilization would return most of the Provincelands to the upland zone.

Geomorphic changes in the upland zone are slow and few. As long as a protective cover of plants is present, erosion in this zone is minimal. Streams are almost universally absent because precipitation percolates to the water table just above sea level and does not feed ephemeral or year-round streams. Sheet wash and gulleying are usually absent on vegetated surfaces. Soil creep on such surfaces moves soil slowly downslope, but this results in only gradual topographic changes. Deposition of sediment is also absent in the upland zone. The absence of streams and the low incidence of erosion on vegetated surfaces means that Holocene alluvial fans, benches, and terraces are absent. Outside the reach of the shoreline foredunes, virtually no sediment has been added to interfluves on the outwash plains since deglaciation. Without a source of sediment to bury the surface and without major erosional processes to resculpt it, the upland's topography reflects essentially the same surfaces that existed about 11,300 years ago, when a boreal forest first covered the outer Cape.

This broad scale topographic stabiliy has resulted in some gradual changes in the upland zone. The moderately developed podzolic soils that cover most of the outwash formed under the temperate forest conditions that have existed for the past 11,000 years. The growth and decay of plants has added organic matter to the soil. Soil organisms, including ants (Lyford 1963) and worms (Atkinson

1957, Stein 1983), have transported soil to the surface and increased soil porosity. The addition of organic matter and th activities of soil organisms may have tended to slightly raise the upland's microtopography. Prehistoric and historic soil disturbance has clearly caused some small-scale changes in topography. Devegetation in the upland zone encourages erosion. Erosion strips soil from topographic highs and this material is deposited in topographic lows, notably the numerous kettle holes on the outwash plain. These small-scale positive and negative changes in relief, while of minimal overall significance, may have major effects for the stratification of archeological sites (see Chapter 7).

The shore zone is considerably more active than the upland zone. Ocean waves and currents, wind, and sea level rise are the major agents of change. The sea has cut cliffs into the glacial drift on both the ocean and bay sides of the outer Cape. Waves undercut the base of the marine scarp, making it unstable and causing sections of cliff to slump onto the beach. Waves remove sand from the beach and currents carry it away. Some sand is deposited on the sea floor, while other material is added to landforms like the Provincelands Hook. The wind erodes sand from the unvegetated scarp face, and some of this sediment is deposited on top of the cliffs in wedge-shaped foredunes. These dunes advance inland as the cliff edge retreats. Foredune advance is rapid, and only pioneer plants like beach grass are able to maintain a foothold on them. The wind also shapes the unvegetated parts of the Provincelands into large parabolic dunes. In protected areas of the shore zone, sea level rise is largely responsible for geomorphic change. The sea gradually floods the land, encouraging the development of salt marshes. The salt marshes trap fine sediments and add abundant organic matter, so the masrshes build upward as sea level rises. Sea level rise also affects the rate of erosion; earlier in the Holocene the rate of coastal erosion was probably even more rapid than it is today, because sea level was rising more quickly than it presently is (O'Donnell and Leatherman 1980: 24-26).

The development of major modern geomorphic characteristics of the shore zone probably occurred by 4,000 B.P. For example, Nauset spit which protects Nauset Marsh from the open ocean is estimated to have been formed by this time (O'Donnell and Leatherman 1980: 33). The development of contemporary patterns of vegetation and other resources in the shore zone would have depended upon the stabilization of geomorphic processes. Each specific area is likely to have had a somewhat different history of development. At Nauset, sand flats to support marsh development apparently had formed by about 1600 B.P. Marsh vegetation development seems to have been initiated between then and 700-800 B.P. in different parts of the marsh (Leatherman 1981: 17-21).

Such temporal variation within even the relatively small area of Nauset Marsh emphasizes the need for specific, detailed environmental reconstructions for some kinds of archeological analyses. The next section will describe the prehistoric vegetation patterns and their temporal variation.

Vegetation Patterns on the Outer Cape

The general vegetation patterns of the post glacial (10,000 B.P. to present) period in southern New England often are described according to one or two tree species that seem to have been dominant during parts of the period, as inferred from pollen analysis. Four general forest types seem to have developed during different time periods:

10,000 to 7,500 B.P.- white pine
7,500 to 5,000 B.P.- oak-hemlock
5,000 to 1,800 B.P.- oak-hickory
1,800 to 400 B.P. - oak-chestnut

Reviews of the data used to generate this general description can be found in Davis (1965), Paterson and O'Keefe (1980), and Whitehead (1979).

The general pattern of vegetation in coastal New England seems to have been a bit different. Oak is dominant there as well, but from about 7,500 B.P. to 400 B.P. pine and birch were next in abundance. Hickory was less abundant than pine and birch, and chestnut occurred in small amounts only (Deevey 1948; Patterson and O'keefe 1980). The outer Cape pattern had its own special configuration within the general one. The pre-European settlement forests were relatively open, by many accounts, due to the periodic burning of understory vegetation by native Americans (Bromley 1935; Day 1953; Russell 1983). An extensive literature search by Altpeter (1937) resulted in the following summary description of the character of the forests of Cape Cod when the first European settlers arived:

> On the elevations above 100 feet...there was revealed to the Pilgrim group an expanse of open park-like forest, the floor of which was fairly well carpeted with coarse grasses. Much of this forest was almost pure pitch pine (Pinus rigida), although between one hundred and two hundred feet elevation were numerous stands of nearly pure oak. Frequent burning prevented the development of shrubby vegetation. On the floor of the pitch pine stands, in particular, these shrubs awaited only a neglect of annual burning to become a real detriment to travel (Morton, 1637).

As the early explorers dropped down to approximately 100 feet elevation above sea level, red oak (Quercus rubra) and beech (Fagus americana) appeared in the stand, and white and chestnut oaks, and red maple became more numerous. White pine also became an important factor in the stand. Pitch pine was still present in stands of this character. Trees of all species were taller and of better form than those found on higher elevations. These stands were subject to frequent burning, but fires were less intense than in stands on higher sites, because heavier foliage and somewhat finer soils resulted in a cooler, moister forest floor. Less grass, but more small shrubs and vines, were present in the understory. It is possible that grape (Vitis spp.), the abundance of which is frequently mentioned by early explorers, began to appear at this elevation; also green-briar (Smilax spp.).

At a level of approximately 75 feet, hundreds of ponds and lakes may be found throughout Cape Cod. Springs and small streams also make their appearance. The effect of heavier soils and a shallower water table upon the forest cover was very noticeable to the early explorer. Forests below this elevation were protected from fire not only by a moister forest floor, but by physiographic features such as lakes, swamps, streams and deeply indented arms of the ocean. Here was found the mesophytic association mentioned by Bradford and Winslow... A mixture of white pine, pitch pine, hemlock (Tsuga canadensis), beech, yellow birch,(Betula Lutea), ash (Fraxinus spp.), hickory (Hickoria spp.), red maple, white and red oak, sour gum (Nyssa sylvatica) and holly (Ilex opaca) made up the dominent tree association, except on sites with a definitely south exposure. The latter sites were occupied by the species within the above group that were capable of withstanding somewhat drier and warmer conditions, namely, white, black and scarlet oak, white and pitch pine, and possibly beech .

The great bogs of Cape Cod were occupied by a luxuriant growth of [Atlantic] white cedar (Chamaecyparis thyoides) in the early seventeenth century. Areas close to tide-water, whose character was more in the nature of a swamp, were occupied by a thick growth of

> shrubs...
>
> A variation in the above distribution of vegetation was created by the agricultural practices of the red men who had dwelt in this area from time immemorial. Since corn and certain other crops were cultivatd by these people, clearings were necessary. Many of these clearings were very large in size. One, whose area is descibed as fifty acres, was found by an exploring party in the present town of Truro. Another, whose length was five miles, was found by John Goodman and Peter Bourne when they had become lost in the woods behind Plimouth village...(Altpeter 1937: 10-12).

In reviewing this description, Patterson, et al. (1983: 6-3) advise that references to elevations might be high for the outer Cape. They advise reducing the noted elevations by 50 or so feet.

Two analyses of pollen cores taken within the survey area are available--from the Pamet Cranberry bog in Truro (Patterson and O'Keefe 1980) and Duck Pond in Wellfleet (Winkler 1982). These provide the most spatially specific information on prehistoric vegetation and its temporal variation on the outer Cape.

The core from the Pamet bog encapsulated 7,000 years of organic accumulations. Initial tree species were dominated by red maple and tupelo or black gum. As more peat acumulated, shrub species became dominant and red maple probably retreated to the margins of the bog. For the last 2,500 years represented in the core, shrub pollen continued to predominate (Patterson and O'Keefe 1980: 20-23). The interpretation one derives from the core is that the bog and its immediate surroundings are generally similar today to what existed there 7,000-5,000 years ago. In the surrounding uplands, oak probably was more frequent and pitch pine less so than it is today.

Patterson and O'Keefe (1980: 23) conclude that:

> In general, vegetation changes on Cape Cod have not been as distinct as those observed elsewhere in New England during the last half of the Holocene period. Specifically, there is little evidence that mesic forest species (beech, maple, hickory, birch and chestnut) have been an important vegetation component during the past 7,000 years.

Winkler's (1982) analysis of Duck Pond core provides more information about the surrounding upland forest vegetation. Between 9,000 and 7,500 B.P. oak dominated ranging from 38-27%; pitch and white range from 26-5%. Also present at relative frequencies of less than 6% are beech, hemlock, tupelo, hickory, and shrubs of the family *Myricaceae*. Even at this early period, Winkler (1982: 64) remarks, "the pattern of vegetation on the Cape...would [have been] familiar to the present day visitor."

During the next 5,000 years, the relative frequencies of tree species remain roughly the same. There is an increase in pitch pine, a fire-adapted species, at the expense of white pine. Winkler also notes during this period an increase in the fine frequency. The decrease in white pine and increase in pitch pine probably was caused by the increase frequency of fines may have been the results of regular burning of forest understorey by prehistoric native Americans. As mentioned above, frequent intentional burning of forest understorey is reported in ethnohistoric accounts from New England (e.g., Day 1953).

Beginning about 2200 B.P. and continuing until European settlement, the total amount and relative frequency of herbaceous species pollen increased reaching 12% of the total pollen. There is also a doubling of the sedimentation rate in both cores from Duck Pond and the fire frequency drops. Winkler (1982:69-71) compares these changes with studies of vegetation changes caused by human land clearance and horticulture in prehistiric Europe (Turner 1970) and other parts of prehistoric North America; southern Michigan (Webb 1973), southern Ontario (McAndrews 1976) and Rhode Island (Bernabo 1977; Bender et al. 1978). The patterns observed in the other studies and those observed in the Duck Pond cores are similar, and they generally are different from the changes observed in pollen records that can be attributed to European settlement of North America (West 1961).

Winkler (1982: 96-97) concludes that the Duck Pond pollen record generally is representative of records from other areas of glacial outwash in the region. She notes similarities between it and other records from Martha's Vinyard, Wood's Hole, southwest Cape Cod, the Taunton River area of southwestern Massachusetts, and the Pamet bog described above.

Winkler briefly reports a preliminary analysis of a pollen core from No Bottom Pond in East Brewster, which is slightly south and west of the seashore. The sediments in this core present

> ...much evidence of pre-European settlement land clearance and agricultural activity. Pollen of *Zea mays* is found at many levels

> below and above a radiocarbon date of 2935 + 65 B.P. [W1S-1126, Bender et al. 1981] (Winkler 1982:72).

The association of corn pollen with a date of that age is startling. The date is over two millenia older than the oldest radiocarbon date for corn from archeological context in New York or New England. The archeological date comes from Martha's Vineyard--790 + 80 B.P. (Y-1653, Ritchie 1969:32). It is inferred generally that corn horticulture became established in southern New England prior to the later date. Snow (1980: 262, 334) has suggested that around 2650 B.P. (700 B.C.) early, and probably limited, horticulture activities were part of human subsistence systems in some parts of southern New England.

The question of when horticulture developed and how important it was to prehistoric inhabitants of northeastern North America continues to confront prehistorians. Even in the relatively rich archeological literature of New York state, there is uncertainty about the occurance of horticulture at as early a date as suggested by the No Bottom Pond date (Ritchie 1980: 188-189; Ritchie and Funk 1973: 96). It is unfortunate that there seems to be a scarcity of archeological sites dating roughly to the 3000-2000 B.P. period. This certainly seems to be a pattern in the survey data base (see Chapters 8 and 16).

The two pollen studies just summarized indicate that by about 500 B.P. a vegetation pattern like the modern one existed on outer Cape Cod. Recent work by Patterson and others lead them to caution against too direct a comparison, however, and they have identified several specific differences.

> It is probably an oversimplification... to assume that presettlement forests were similar to those found on the Cape today (which are widely considered to be the product of repeated fires in the 19th and early 20th centuries as well as persistent grazing by sheep during that period). Mention of trees such as yellow birch, maple,beech and hemlock in several early accounts suggest that at least some areas supported mesic vegetation types that are rare today. Additional evidence for greater cover-type diversity prior to [European] settlement [comes from sedimentary studies] (Patterson et al. 1983:6-4).
>
> [Pollen] percentage data suggest...that oak is less abundant today than at any time during [the last 5000 years]. Other deciduous species (especially beech, hickory and maple) have also

> declined in importance since [European] settlement. Although never common, these species clearly occurred more frequently in the presettlement forest
>
> Beech, in particular, is interesting ...percentages of 5-10% (which are high for beech--a notoriously poor pollen producer) in sediments dating from 4700-400 B.C. suggest that beech may have been as common in [some areas]...as it is in the modern Beech Forest in the Provincelands (Patterson et al. 1983: 6-10).

The following section summarizes briefly the major types of natural environments on the outer Cape. These summaries are presented so that readers may become familiar with the natural environment of the outer Cape and get a general sense of thr natural resources that would have been available to prehistoric inhabitants. The summaries are qualitative and general. As cautioned in the introduction to this chapter they are inadequate for any detailed analysis of site locations, resource potential, economic decision-making, or anything along those lines. Nevertheless, with more research and quantification, they might serve as bases for such studies.

Environments on the Outer Cape Cod

Three major types of environments are described here--coastal margins, freshwater wetlands and uplands. These are distinguished by topographical and hydrological criteria. These major environmental characteristics in turn influence the vegetation and fauna that inhabit the environments. The division follows one used by Snow and Valiela (1979) to summarize vegetation patterns for the entire Cape. Another detailed breakdown of natural environmental characteristics can be found in Godfrey et al. (1977).

Coastal Margin

The coastal margin of the outer Cape includes long stretches of ocean and bay beaches backed by eroding scarps that are barren or colonized precariously by tuffs of beach grass. At protected locations along the coast and in estuaries subtidal vegetation and salt marshes have formed. Nauset Marsh and the shore of Wellfleet Harbor are examples of these marshes. The tidal flats and salt marshes of these protected locations have abundant and diverse flora and fauna, including crustaceans, molluscs, and both migratory and native fish (Whitlach 1982: 18-48).

Salt marsh can be divided into two zones, the low marsh, from mean low water to mean high water, and the high marsh, above mean high water. The former is dominated by cordgrass, while the latter contains shorter and finer grasses such as saltmarsh hay, spike grass and black grass (Snow and Valiela 1982: 26-27). Both zones offer important habitats for molluscs, crustaceans and young fish (Curley et al. 1972; Nixon 1982; Nixon and Oviatt 1973).

The tidal flats and salt marshes are habitats for many species of birds as well. Plovers, sand pipers, gulls, terns, herons, loons, grebs, comorants, geese and ducks are among the seasonal or year round inhabitants (Whitlach 1982: 49ff). The types and abundance of birds and fish vary daily and seasonally. Daily flutuations involve short movements for feeding while seasonal movements result in some species being unavailable in the environment at some times of the year. Whitlach (1982), Nixon and Oviatt (1973), Curley et al. (1972) and Godfrey et al. (1977) provide information on specific species.

Freshwater Wetlands

Four different types of environments can be fit under this category: freshwater marsh, bog, shrub swamp, and wooded swamp (Snow and Valiela 1979: 26-29). These types are differentiated by the amount of standing water and soils. In reality, they are points on a continuum rather than sharply distinct entities.

Freshwater marshes range from areas with up to six inches of standing water to areas of waterlogged soil. They frequently form along the shallow margins of ponds on the outer Cape. Vegetation consists of reed grass, cattail, and rush in wetter situations, and meadowsweet, goldenrod, grasses, rushes and sedges in less wet locations.

Most of the ponds on the outer Cape are kettleholes filled by groundwater (O'Donnell and Leatherman 1980; Strahler 1966). They had no natural outlet to streams or rivers and, therefore, no passageway for fish to enter. Unless artificially stocked or opened to the rivers or ocean, most fauna in these bodies of water are microscopic (Godfrey et al. 1977). The ponds seem unlikely to have presented prehistoric inhabitants of the outer Cape with any substantial subsistence resources. The wetland vegetation on the fringes of some ponds, on the other hand, probably provided subsistance resources and raw materials for containers, structures, and other coverings.

Bogs form on acidic, nutrient-deficient, waterlogged soil. The vegetation includes cranberry, sphagnum moss, bog clubmoss, blueberry and huckleberry. Shrub swamps form as a transition between open ponds or freshwater wetlands and forest. Their vegetation is somewhat similar to bogs, including, highbush blueberry, swamp azalea, sweet pepperbush, shadbush, and catbrier. Wooded swamps are areas of standing water (2-3 feet) with either Atlantic white cedar or, in shallower areas, red maple trees. These swamps are dark, cool and humid with moss and ferns growing on hummocks or at the bases of the trees.

The freshwater wetland environments would have provided some wild plant food resources, such as berries, for prehistoric residents. Native fish populations probably were not available in the ponds due to their isolation.

The lower, protected locations of the drier types of wetland or wetland fringes may have been favored by white-tailed deer. Edge areas, such as wetland fringe provide the type of browse that deer feed on (Townsend and Smith 1933: 250-253; Severinghaus and Cheatum 1956: 136-138; New York State Department of Environmental Conservation n.d.). In other parts of the northeastern United States, deer winter in valleys or swamps that offer protection from the wind (Madson 1961: 23; Rue 1978: 292-325; Severinghaus and Cheatum 1956: 140). Some of the freshwater wetland environments could have provided similar winter protection.

Uplands

Most of the outer Cape can be considered uplands. Some of this area contains abandoned pasture and fields that gradually are being recolonized by forest species. The balance of the uplands are covered by one of three types of forest--pitch pine, mixed, or hardwood (Snow and Valiela 1979: 29-32). The differences between the modern forest types and prehistoric forests were discussed above in the section on vegetation history. Prehistoric forests had a greater abundance of oak and of other species that are very rare today, such as beech. The earlier forests were more diverse than the pitch pine and mixed pine-oak forest types that currently cover most of the uplands.

All of these forest types contain understory vegetation that includes various species with subsistence potential. Huckleberry, blueberry, and blackberry are the most obvious of these species. The forests also provided habitats for many of the mammal species that were found on the outer Cape. The information on native mammal populations, unfortunately, is very limited. What information there is from the area within the seashore itself is summarized in the next section.

Mammal Species of the Outer Cape

Mammal species and particularly large mammals, are singled out for special attention because they provided important subsistence, clothing, and tool resources for prehistoric native Americans. The following excerpt from Godfrey et al. (1977) presents the little that is known about these species. It may serve as a beginning to a native mammal species list for the outer Cape. One could build from such a list, by adding natural historical information on species' habitats, abundance, and other characteristics, a resource availability model along the lines of those constructed by Jochim (1976) and Keene (1981).

> Little is known about the mammals of the outer Cape. As a rule, the mammals found here are ...nocturnal and shy... No detailed studies have been done for outer Cape Cod.
>
> Six species of shrews and moles are listed as being found in the Seashore. One species of mole is quite common on the backside of Nauset Spit on the border of the salt marsh. Deer are notably common in the Seashore, but are not usually seen abroad during daylight, particularly during the summer tourist season. Animals such as deer, which are especially wary, probably need substantial refuges or retreats (i.e. essentially quiet and undisturbed areas, as now exist in the Seashore) to which they can retire during the tourist season. Deer forage occasionally on the moors in the Seashore where there are patches of dense thickets, woodland and swales available for fast cover. There is probably a substantial breeding population in the heavy forest and hollows on the backside of Wellfleet. Also, the oak-pine forest behind Nauset Light formerly harbored a fair number. The population of white-tailed deer on Monomoy Island is now said to be subspecific, being smaller than the mainland deer. There is some debate as to whether this is genetic or due to differences in diet. Cape Cod deer as a whole are said to be smaller than mainland deer...
>
> Raccoons are widespread ...and prefer water close by. Short-tailed and long-tailed weasels are found in brushy and wooded areas generally near water... The striped skunk is generally abundant in semi-open country [and] mixed woods... The red fox is fairly common occupying forest and open areas, including

> upper salt marshes. It has been seen at Morris Island, Chatham, at Wellfleet Bay sanctuary hunting in the salt marsh, and in dune thickets way down on North Beach near the old Coast Guard Station... The snowshoe hare and New England cottontail are common in brushy areas and open forests.
>
> The harbor seal which winters in southern New England and summers in northern New England coastal waters is often seen up on rocks and sand bars. The status of the gray seal is unclear. It is considered rare, but recent discoveries reveal a longtime breeding colony in Nantucket Sound and increased sightings along the new England coast.
>
> Woodchucks are absent in fields, open woods and old pastures. The eastern chipmunk is found in deciduous forests and brushy areas. Red squirrels, eastern gray squirrels and southern flying squirrels are common in forests. Other common mammals include the southern bog lemming, meadow vole, muskrat, ...and meadow jumping mouse (Godfrey et al. 1977: VI-1-VI-2).

Summary

This chapter has described the natural environment of the outer Cape and its development. The descriptions have been brief with references provided for the readers interested in pursuing more details on related topics.

The outer Cape is a relatively small area and none of the different types of environments are separated by great distances. Indeed, it would have been very easy to have exploited coastal, wetland, and upland resources from single locations. Even the rough analysis available at present for the faunal and floral remains (see Chapter 10) suggests that all environments were being exploited. The archeological context of these remains--shell and general middens in concentrations at Nauset --indicates that the widespread exploitation was occuring from bases in this one area at least (see Chapter 16). Two substantive questions remain to be addressed by further analysis: was similar widespread exploitation also occurring from bases at High Head and other areas, and what was the short and long term variation of which different environments and resources were exploited?

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CHAPTER 5

Ecological Niche Theory, Cultural Adaptation, and Current Interpretations of Prehistoric Cultural Adaptations on the Southern New England Coast

Francis P. McManamon

This chapter covers many bases. It presents the theoretical orientation that has guided the analysis of the survey data and provides an overview of current interpretations from this particular theoretical perspective. The theoretical orientation was derived and developed using concepts and methods from the discipline of natural ecology. To the extent that it is pursued here, this orientation provides an explicit method for describing cultural adaptations. It has promising links to theoretical explanations of cultural evolution, several of which are mentioned later in this chapter.

Anthropology and Ecology

Nature and its variations are the subject matter of ecological investigations. "The relation of organisms or groups of organisms to the environment, or...the interrelations between living organisms and their environment..." are the kinds of topics with which ecologists are concerned (Odum 1971:3). Therefore, Odum (1971:3) has defined modern ecology as "...the study of the structure and function of nature..."

Ecologists direct their investigations to different levels of biological complexity. Biological complexity can be conceived of as a spectrum of levels of organization encompassing sub-cell units at one end and ecosystems at the other, with organisms, populations and communities in between (Odum 1971:4-5). Pianka (1978:4) provides other examples: individual, family group, species, and includes all of these units under the general title of "organismic unit." Ecologists who investigate the more complex end of this spectrum commonly use populations, communities and ecosystems as their units of analysis (Odum

1971:4). In addition to examining the structure and function of interactions among organisms and between them and the nonliving world, some modern ecologists also are interested in the understanding and explanation of the origins of these interactions (Pianka 1978:1).

There are two kinds of answers to ecological questions, the proximate and the ultimate (Pianka 1978:15-16). The proximate is concerned with describing and explaining functionally the characteristics or behavior of organismic units. This approach is the one described by Odum and mentioned already. Investigations seeking ultimate explanations of ecological phenomena consider the long-term process through which the present characteristics or behavior of organismic units came to exist. This concentration on ultimate explanations characterizes the subdiscipline known as evolutionary ecology (Pianka 1978). For these investigations, natural selection and populations usually are embraced as the main causative factor and unit of analysis, respectively.

Pianka (1978:15-16) believes that both proximate and ultimate answers are needed within the science of ecology in order to obtain really thorough explanation of biological phenomena. Therefore, modern ecology has two goals: (1) the accurate description and understanding of the behavior of existing organismic units, and (2) the understanding of long-term processes that have caused the present structure and behavior of existing organismic units.

Even such a brief summary of ecology's subject matter and goals is sufficient to suggest the potential for application of its concepts, methods, and techniques in anthropological investigations. Ecology, like anthropology, deals with the relationships within, between, and among analytical units. In anthropology, as in ecology, the units of analysis are most commonly at the more complex end of an organizational scale. Anthropologists, for example, most commonly take groups of individuals as their focus. The population structure and cultural complexity of these groups range from bands to states. Ecologists and anthropologists investigate both proximate and ultimate explanations of their subject matter. Kaplan and Manners (1972:34), for example, note:

> ...the primary goal of a scientifically conceived anthropology is to provide the best possible explanations for a broad range of problems which can be subsumed under two general questions: "How do cultural systems work?" and "How have they come to be as they are?"

Both anthropologists and ecologists also are keenly interested in how their analytical units get along in their environment. This is, of course, a primary subject of ecology. Ecologists have developed concepts, methods, and techniques for investigating and explaining such relationships. Therefore, anthropologists might find useful ideas among those developed and used by ecologists. Anthropology, at the same time, can provide ecologists with useful concepts, methods, techniques and substantive information. Ecological hypotheses developed from studies of nonhuman species can be tested independently with data about humans, for example. Furthermore, ecologists interested in studying human groups might profit from anrthopological methods and techniques for research design, data collection, and analysis (Diamond 1977).

This plethora of connections between ecology and anthropology has not escaped the notice of others. Anthropologists have used ecological terms, concepts, methods and techniques at least since the 1930's (e.g., Geertz 1963; Meggers 1954; Rappaport 1968, 1971; Steward 1938; Vayda and McCay 1975). In contemporary anthropology, ecological terms, concepts, methods and techniques have substantial and increasing usage, indicated by the appearance during the last decade of textbooks dealing with the subject (e.g., Butzer 1982; Ellen 1982; Hardesty 1977; Jochim 1981; Little and Morren 1977; Netting 1977). Important progress in anthropology has been one result of some of these applications.

Criticism of loose borrowing from ecology by anthropologists, however, warns of the potential for abuse whenever disciplinary lines are crossed (Hardesty 1980:185-160; Schiffer 1981:901-905). The tailoring of ecological concepts for anthropological use in this study attempts to avoid such abuses.

Anthropologists have tended to use ecological concepts loosely. Hardesty (1980:157) recently complained that "...ecology is used heuristically, not as a set of formal explanatory principles that can be brought to bear upon...problems." Ecological explanations of human behavior have been ad hoc, devised to explain particular situations and lacking strong association with an ecological concept that could make them more widely relevant. In addition and at a more basic level, common methods of measuring concepts, such as "adaptive states," are undeveloped in anthropology.

One reason for this has been the unwillingness of many anthropologists to regard human adaptation on the same level as the adaptation of other species. Since it wasn't the same, nothing could be gained by applying the concepts or analytical techniques of natural ecology; on the contrary, there were good reasons not to. Our own species' adaptation, however, is now regarded as similar in many ways to that of closely related species. Not coincidentally, anthropological analysis of human cultural adaptation rigorously using ecological concepts and techniques is becoming more commonplace (see Orlove 1980). If anthropologists adopt the concept of niche as a means of describing the adaptive states of human populations, and follow the lead of ecologists in developing an explicit, operational definition of niche, the results of anthropological studies of human cultural adaptation will be more easily compared and compiled. Eventually large scale comparisons such as Schoener's (1974) examination of niche dimension variation among nonhuman species may be possible.

The use of concepts or techniques developed in another discipline should be undertaken carefully in any case. Some enthusiastic anthropologists have pushed ecological analogies or homologies too far in the analysis of human phenomena leading to criticisms of superficiality, selectivity and triviality (Hardesty 1980:159-160). In order for ecological concepts and techniques to be useful in anthropology, their relationship to anthropological phenomena must be clear and the ecological concept must be operationally linked to the anthropological situation (Hardesty 1980:161).

In the first half of this chapter two concepts with histories in both ecology and anthropology-- adaptation and niche-- will be discussed. Specifically, the possibility of using the latter as a means of quantifying the former and the value of this for both descriptive and explanatory studies will be considered.

Anthropology and Adaptation

The attention anthropologists have devoted to human adaptation is a measure of its importance in the discipline. Humans adapt to their environment physiologically (e.g., see Little and Morren 1976:Chapters 4 and 5) as well as culturally or behaviorally, but it is adaptation through behavior that has occupied most anthropologists who have investigated human adaptation. Adaptive behavior promotes the survival and reproduction of individuals and the maintenance and continuity of the social units or groups they form. For the remainder of this study, human adaptation through behavior will be referred to as cultural adaptation.

Despite its centrality "adaptation" often is defined poorly and used casually by anthropologists. At least two meanings of the term are recognized (Alland and McCay 1973:144; Alland 1975:59; Kirch 1978:106;1980a:103). In their lengthy review of adaptation, Alland and McCay (1973:146-148) discuss the various uses of "adaptation" by anthropologists which are similar to the different uses in biology. One common definition is that adaptation is a state of fitness. In this sense, the way of life followed by a human population is its adaptation. An adaptive state is linked to a specific time and place. It is a description of how a group copes with the environment it resides in, which may have social as well as natural aspects.

The other commonly used definition of adaptation refers to it as a process of change to suit changing environmental circumstances. In contrast to an adaptive state, this meaning involves longer, in some cases evolutionary, periods of time and a varying environment. Put simply, adaptation as a process encompasses the procedure through which one adaptive state changes into another. It also usually does not deal with a group of specific individuals because over the longer period of time the individual members of a group change.

The adaptive states of many human cultures have been described and analyzed with an ecological perspective. Specific approaches include detailed ethnographies, such as Rappaport (1968) and Watanabe(1973), as well as less encompassing treatments, such as those focusing on energy flow (e.g., Kemp 1971; Lee 1969). There have been far fewer examinations of the process of adaptation, and these treatments have tended to be theoretical rather than substantive (e.g., Alland 1975; Flannery 1972). Moreover, although their relatedness is recognized, the specific relationships between adaptive states, the process of adaptation and cultural evolution are disputed (e.g., Diener 1974; Durham 1976; Ruyle, et al. 1977; Diener, Nonini and Robkin 1980).

One view of cultural adaptation that promises to provide a widely useful perspective on adaptive states and process is analogous to the view of adaptation in evolutionary ecology (Alland and McCay 1973:170-174; Bennett 1976; Durham 1976; Jochim 1979; Kirch 1978;1980a). This view has three primary premises (Kirch 1980a:109):

(1) Behavior is variable and there are sources of behavioral variation in innovation and the diffusion of ideas.

(2) Some behavior is perpetuated because it helps individuals cope with their natural and social environment. Successful behavior is repeated and perpetuated as long as it helps to solve the environmental problems, and so long as it does not raise new problems. The natural and social environment, therefore, has a substantial effect upon what behavior or activities are retained and repeated.

(3) Useful behavioral strategies are retained and transmitted among the human group(s) or population(s) for which they have proved successful.

Neither the generation nor the transmission of behavioral variation is considered genetic according to this view. Human behavior is identified as the crucial phenomenon for observation. This is particularly appealing to archeologists who must deal with the remains of behavior and cannot rely upon informants or interviews.

This perspective makes an important link between adaptive states and the process of adaptation through the second principle listed above. The behavior that is perpetuated because of its success in coping with environmental factors is a part of the adaptive state under investigation. An environmental change that requires a modification in the way of coping leads to a different state of adaptation. The process of adaptation is the pattern, substance and method of change between the earlier and later states. This relationship links the concept of adaptive state and the concept of adaptive process closely. Similar variables can be used to characterize each. For instance, an earlier and a later adaptive state might be described by ranges and frequencies of food resource utilization (Hardesty 1975; Kirch 1980a:143-5). The process of adaptation that occurs between the states is described by the change in resource utilization, the rate of change, the direction of change and the environmental factor that caused the change (i.g., Plog 1979).

Finally, the analogy between this view of cultural adaptation and the evolutionary ecology view enables anthropologists to examine the utility for anthropological studies of theories and generalizations from the former discipline. Some of this borrowing already has occurred with profit by anthropologists examining human biogeography, social organization and intergroup relationships (e.g., Terrell 1976, 1977; Diamond 1977, 1978; Chagnon and Irons 1979; Love 1977; Kirch 1980b; Orlove 1980).

The problem of operationalizing the use of "adaptation" and developing techniques of measuring both adaptive states and the process of adaptation is crucial for advancement in the study of cultural adaptation. Without consistent or comparable data collection and analysis, explanations from studies of specific adaptive states or instances of the process of adaptation will remain isolated (Hardesty 1980:158-159). Useful empirical generalizations, testable hypotheses and theories from them will not be developed; helpful general information will continue to be difficult to wrest from disparate studies of specific cultural adaptations. Cordell and Plog (1979), Kirch (1978,1980a) and Orlove (1980:251) have suggested that "adaptive strategies" can be defined and examined to measure an adaptive state or at least important portions of a state.

Adaptive strategies are composed of "...the many separate adjustments that people devise in order to obtain and use resources and to solve the immediate problems confronting them" (Bennett 1969:14, quoted in Orlove 1980:251). Cordell and Plog (1979:409) define them similarly as "...the modifications of behavior and material items that prehistoric peoples made in attempting to cope with one another and with the natural environment." For Kirch (1980a:129-130) these strategies are:

> ...the set of culturally transmitted behaviors-extractive, exploitative, modifying, manipulative, competitive, mutualistic, and the like-- with which a population interacts or interfaces with its natural and social environment. An adaptive strategy will change in response to changes in the

> selective pressures of the environment...

These definitions are very similar to the definition of "niche" used by ecologists. Adaptive strategies are the behavioral means by which individuals cope with their environment. The aggregate of members' activities defines the adaptive strategy of a human social group.

Adaptation and Niche

Ecologists have made a close connection between adaptive states and niche. Early definitions of niche referred to it as the role of a species in an environment or community. Other definitions (Odum 1959, cited in Pianka 1978:238) refer to "structural adaptations, physiological responses, and specific behavior (inherited and/or learned)" that determine the niche of an organism within its community or ecosystem. Pianka (1978:238) presents an even more direct link of the concepts:

> ...I define the ecological niche as _the sum total of the adaptations of an organismic unit_, or as all of the various ways in which a given organismic unit conforms to its particular environment. [Original emphasis.]

Niche serves ecologists very well as a means of describing adaptive states operationally.

Niche is a central concept in ecology. Indeed, "ecology might almost be defined as the study of niches" (Pianka 1978:237). It is used in synchronic, functional analysis and proximate explanation of the relationships between species populations and within ecological communities (e.g., MacArthur 1958; Hespenheide 1975; Pianka 1975). Niche also has become an important part of generalizations and theories about populations and community relationships (e.g., MacArthur and Wilson 1967: Chapters 5 and 7; Schoener 1974). Niche has become an integral part of evolutionary analysis and of the ultimate explanation of relationships among species and within communities as well. As noted by Whittaker and Levin (1975:7-8)

> Species evolve toward difference from one another. Evolution in directions that reduce competition is a major basis of the divergence...Coexistence within a single community, without supportive migration from adjacent communities is by difference in niches... : The community is a system of niche-differentiated, interacting species... The overall result [of evolution] is the existence of innumerable communities in diverse habitats in different regions, comprising all together a few millions of species that can survive because they differ in area or habitat, or because in particular communities they have evolved those differences in relationship to one

another that we term niche.

The concept of "niche" in ecology was formulated originally in the early part of this century by both Grinnell and Elton. Elton used the term to refer to an animal's role in an ecological community, including its position in the food web and a variety of other habitats. For Grinnell, niche was a spatial concept referring to a place or places occupied by a species (MacArthur 1968:160). Niche was given new meaning about mid-century when Hutchinson (1957) reformulated the concept (MacArthur 1968:160; Pianka 1978:239-241; Whittaker and Levin 1975).

Hutchinson conceived of a niche as the combination of ways in which a population articulates with all of the environmental factors it encounters. Each environmental variable was considered a dimension along which the population's adjustment to the variable could be plotted. This concept of niche has been termed the "hypervolume model" because the combination of adjustments theoretically could be graphed in n-dimensional space. "Thus Hutchinson defines an organism's niche as an n-dimensional hypervolume enclosing the complete range of conditions under which that organism population or species can successfully replace itself" (Pianka 1978:240).

The complete set of conditions of features and behaviors theoretically available to a population for exploration of an environment is its fundamental niche. In reality, most niches are restricted by specific environmental conditions and combinations of conditions; the important niche is the one actually realized by the population. Even this more restricted set of conditions, referred to as the realized niche, involves articulations with a large number of environmental variables or dimensions. A further complication is that a niche, even a realized niche, is dynamic. It changes temporally and spatially as the natural and social environments vary.

> ...the realized niche can be thought of as an everchanging subset of the fundamental niche, or in the n-dimensional hypervolume model as a pulsing hypervolume bounded by the hypervolume corresponding to the fundamental niche (Pianka 1978:246).

In attempting to apply this niche model, biologists quickly became aware that only a few niche dimensions could be investigated simultaneously. It became important, therefore, to determine the dimensions most important to the well-being and survival of the population under consideration. Some ecologists examined the competitive relationships among populations comprising ecological communities. They reasoned that the most important niche dimensions for a population would be those in which it competes or might compete with other populations using the same or similar resources.

Attention to the dimensions of niches indicates that the relevant dimensions depend upon the general type of selection to which a group or population is subject. Two polar types of selection with gradients between them are recognized, r and K selection. K-selected populations are those that survive or become extinct because of their relative competitive ability. Homo sapiens is a K-selected species.

When considering the adaptations of relatively K-selected organisms the number of niche dimensions can be limited to those on which competition is effectively reduced. Competition is often avoided by differences in microhabitats exploited, foods eaten and/or times of activity; and so the effective number of niche dimensions can often be reduced to three: place, food, and time (Pianka 1978:247).

In addition, comparative studies of ecological communities show that, in general, "habitat dimensions are important more often than food-type dimensions, which are important more often than temporal dimensions" (Schoener 1974:33) for avoiding competition between or among similar species populations. The identification of relevant variables is a crucial part of any research effort. Ecological studies of niche dimensions provide social scientists with evidence of potentially relevant dimensions for the examination of human ecological niches.

The fact that a niche was theoretically n-dimensional also meant that complete measurement of a single niche was impossible because n could increase without limit. By deciding upon a few dimensions that could be argued to be particularly important, however, ecologists could compare niches of different species or of the same species at different points in time. Moreover, these comparisons could be made using quantified measurements along the dimensions selected for study (MacArthur 1968:160-161). Hutchinson's reformulation of "niche" had provided ecologists with a concept through which the adaptive state of species populations could be measured quantitatively, a means of making explicit and comparable the description of adaptive states.

"Niche" also offers anthropologists a means of explcitly and quantitatively describing adaptive states. In a few instances, anthropologists have recognized the usefulness of the concept and used it quantitatively (Hardesty 1975, 1977, 1980; Kirch 1980a:140-143) or qualitatively (Barth 1956; Love 1977). Most of the concern about measurement and accurate description, however, has concentrated on the adpative process (Alland and McCay 1973:144, 173-174; Alland 1975:59-60). The latter have emphasized measuring evolutionary adaptation and its success through comparative demographic success, at least where egalitarian societies are involved (Alland 1975:59-60). This measure, however, seems to inform us of little except that a change has occurred and the direction of the change.

On the other hand, by describing and comparing several relevant dimensions of two or more temporally or spatially distinct adaptive states, it is possible to note in much more detail the change(s) that occur between the spatial or temporal points. Depending on the number of points available for comparison, important inferences about the process and pattern of change, its direction(s) and rate(s) can be examined (Plog 1979). An explicit and quantitative description of adaptive states, then, seems the appropriate beginning point for the study of adaptation, as either state or process. The concept of an ecological niche with several relevant, measurable dimensions is an important tool for describing human adaptive states. As described in the next section, the manner in which niches vary in space and time holds a number of insights into the process of adaptation and causal factors.

Niche Dynamics and the Process of Adaptation

How and why a niche changes have been examined empirically and theoretically by ecologists (e.g., MacArthur and Wilson 1967; Levins 1968:Chapter 3). The subfield of island biogeography, particularly the topic of colonization, is a rich source of information and insight about niche dynamics. The colonization cycle has four overlapping phases each of which might involve change in the niche of the colonizing population, and concomitantly, in the niches of any ecologically similar populations in the area being colonized. The cycle phases (MacArthur and Wilson 1967:78-79, 149-173) include:

(1) successful establishment, which is by no means assured,
(2) population responses to initial small size (e.g., founder effect or changes in life table),
(3) adjustments to the novel features of the environment, including competitors,
(4) speciation (occasionally), emigration or radiation.

The specific adaptive state of a population affects the nature and magnitude of niche shifts in any phase. Generalizations and theoretical arguments concerning niche shifts in the third phase seem to have the widest applicability since adjustments to environmental changes are continual in most environments and need not be associated with colonization.

Two general types of niche changes can occur: ecological displacement, from which a shift or limiting of the niche results, or ecological release, which results in an expansion of the niche. A colonizing group invading a relatively unoccupied area probably will expand its niche, using habitats and food types it had not used in a previous location where more effective competitors kept its niche more confined. Ecological releases can occur not only in colonization but when new resources or new means of exploiting old resources develop.

Ecological release does not continue unabated. The species population changes its niche to conform to the new environment or the new conditions of the same location. Eventually the niche expansion is halted by competition from other species that more effectively exploit the resource concerned, or the species population's behavioral or morphological limits are reached.

An important point connecting niche and the process of adaptation should be derived from this discussion. It is evident that:

> a species' ecological role is plastic...it can be closed out of a community...[or] it may successfully invade even if its niche is full, providing it is a superior competitor (MacArthur and Wilson 1967:94).

In other words, a niche observed and described at one time or place is one view along a continuum. For some purposes the single view might be adequate. Yet, for diachronic studies of adaptation, niche remains an appropriate and useful concept because studies of the process of adaptation link together a temporal series of adaptive states to examine changes over time. Studies that focus on the adaptive process examine the differences among temporally distinct states in terms of rates, magnitudes and directions of change. Although niche is a concept lashed to one point in space and time, it remains vital for comparative ecological studies that consider ranges of space and time.

Niche and Cultural Adaptation

By adopting the concept of niche as currently formulated by ecologists and applying it to the ecological study of human cultural adaptations anthropologists gain two things. The first gain is a concept for describing the adaptive state of a human population, and an explicit method for assembling the description. The use of niche as a description of an adaptive state is discussed in detail below. It is this use of the niche concept that is most directly relevant for this study.

The second gain that can accrue from the use of niche is the considerable linkage betwen various kinds of changes in niche and different types of environmental fluctuations. The remainder of this section will discuss these links and provide examples of their application to anthropological studies.

By identifying the niches of human populations that occupied the same area through time, temporal variations in adaptive states can be identified. Depending upon the number of temporal observations, the process of change can be described more or less precisely. The causes of these variations can be sought in contemporaneous variation in the social and natural environments. Empirical generalizations and theory, for example, suggest that ecological release will occur when a population enters an environment without competitors. Technological or behavioral changes which improve a human population's ability to exploit its environment, in effect expanding the realized niche, also should result in ecological release. If the archeological reconstruction of niche variation over time shows one or more periods of release, correlations with the factors that might have affected the niche expansion can be examined to discover the one that is causal.

Periods of ecological displacement can be treated similarly. If competition with another group or groups is the cause of displacement, a variety of implications from biogeographic theory can be used to examine and explain the process of displacement. Competition between human populations with similar or overlapping niches can result in the ecological displacement of either or both in one or more of the relevant niche dimensions. Even periods without expansion or displacement can be informative. The reasons why something expected to change remains unchanged are at least as intriguing as the examination of change.

The next two sections examine examples of the use of "niche" by antropologists, as well as the use of the ecological principles of biogeography, among them the concept of niche.

The Use of "Niche" in Anthropology

Anthropological use of "niche" is at least 25 years old. Frederick Barth (1956) used it to structure his analysis of the geographical, symbiotic and historical relationships among three ethnic groups in Swat, Pakistan. The principal goal of Barth's article was to criticize "culture area" studies that linked cultures to large sections of continents or subcontinents (e.g., Kroeber 1939). He argued that "...detailed [local] ecological considerations" rather than subcontinental areas should be the beginning point for studying "...the form and distribution of cultures" (Barth 1956:1079). Barth cited Allee et al. (1949:516) for the definition of "niche" that he used: "...the place of a group in a total environment, its relation to resources and competitors" (1956:1079), and he used the Swat data to make his point. The weaknesses of Barth's article were the lack of discussion about how ethnic groups were defined and about how individuals were classified into different groups for analysis.

Overlooking this, Barth's use of niche included two important components. First, although he concentrated on the spatial differentiation among the groups, this was related directly to environmental factors and, most importantly, to specific behavior, activities, and organization of individuals from different ethnic groups that allowed them to adapt to one section of the area but prevented them from adapting to other parts of it. Barth's research was completed before Hutchinson's landmark definition of the multidimensional niche, so it includes no reference to dimensions of the niches of different ethnic groups. Careful reading, however, shows that he considered at least the dimensions of habitat and food resources to contrast the niches of different groups.

Barth's explicit inclusion of the social environment as a crucial variable for explaining the groups' spatial ditribution was the second important component of his analysis. He showed that the relationships among the ethnic groups were as relevant as the natural environmental diversity for explaining their spatial distribution (Barth 1956:1082).

To summarize, the most notable aspects of Barth's use of niche, therefore, were: (1) the multi-dimensional, albeit implicitly so, definition and comparison of the niches of different ethnic groups, and (2) the explicit attention and importance assigned to the social environment, in this case, intergroup relations.

It was nearly 20 years before the next explicit use of niche appeared in an anthropological analysis when Hardesty (1972, 1975:72) suggested niche as a means of "defining ecologically distinctive human groups." He recognized the importance of dimensional analysis of human niches and its operational usefulness; and, he offered examples of how types of subsistence resource, resource procurement locations and temporal variation in resource procurement could be used to characterize the niche, and by implication the adaptive state of a particular human population (Hardesty 1975:75-82). By extension, he noted that comparative studies could contrast the niches of different groups.

Hardesty followed contemporary natural ecologists (e.g. Schoener 1974) in focusing on food, time, and place as relevant niche dimensions. Recently he has suggested that other dimensions or different measures of the former dimensions (e.g. tools, timing, the organization of work) also could serve to define human ecological niches (Hardesty 1980:167-169). In comparative studies, he suggested, differences in the portion of a niche dimension used by different coexisting human populations (termed "cultural species" by Hardesty) could be used to differentiate the populations' niches.

The most detailed recent anthropological use of niche was by Love (1977), whose analysis is all the more interesting because it examines a contemporary situation in a developed society. Love investigated the competitive relationship between two groups in the Sacramento Valley of northern California. He illustrated how one group, "retirement farmers" in a small section of the valley, have recently outcompeted another group, the "small farmers," in the acquisition of farm land, a limited and essential resource in the valley.

Love (1977:37-38) concluded that:

> with respect to land, the "retirement farmers" have a competitive advantage [outside capital from savings or other employment] over full-time smaller farmers...the result of which is niche displacement....Competition is forcing a few [of the small] farmers to enlarge their holdings, others to change their patterns of use of productive resources, and still others to sell out.

Love's case study, as well as those by Barth and Hardesty, points out important aspects of anthropological uses of niche. First, as with Barth and Hardesty, human niches can be characterized by quantitative measurements of relevant niche dimensions. He, however, proceeds beyond the basic food, place, or time dimensions of natural ecology to consider

> ...those resources-- such as land, labor, capital, and other productive resources-- which are the most critical to the life chances of the individuals comprising the categories under study....The niche concept directs analytical attention to those economic, kinship, political, and social organization features which confer competitive strength or advantage on a group (Love 1977:31-33).

A second important point in Love's article derived from the focus on intergroup competition. It was the changing relationship between the two groups that modified the niches of both. The social environment, rather than the natural environment, was causal. The importance of intergroup relations, particularly competition, is well recognized in contemporary ecology (Diamond 1978). Such relations seem to be particularly important in environments that do not present harsh natural environmental constraints.

The analysis contains a final, related point about environmental variation, in this case temporal variation in the social environment. Love shows that the development of retirement farms is a recent phenomenon in the study area. Social environmental change in the valley has caused its formerly isolated resident population, the "small farmers," to adjust their behavior to survive under the new conditions. The importance of environmental change, social or natural, was demonstrated by Love's analysis; it not only initiated modifications in the existing human niche but constrained to varying degrees the niche changes that successfully coped with the new environment.

Kirch (1980a:140-143) also recognized the potential usefulness of niche. He noted the multiple dimensions of niche, the importance of quantitative measurement, the variety of dimensions that could be used to characterize a niche and the potenital of niche for comparative studies and studies of intergroup competition.

The Use of Niche in Human Biogeography

Diamond (1977, 1978) and a number of anthropologists(e.g., Kaplan 1976;Terrell 1976,1977; Irwin 1978; Kirch 1980a,b) have applied biogeographic theories, methods, and techniques in the study of human populations and population distributions. Their successful application of theoretical and methodological results from nonhuman biogeographical research to human population studies indicates that this is not inappropriate borrowing across discipline lines.

> In fact...every animal species is basically different from other animal species. Faced with this diversity, biogeography has developed a common framework...by seeking relations among key variables or processes. These variables or processes are ones that are relevant to understanding any species (Diamond 1977:249).

One potential complaint might be that competition in nonhuman species is viewed as interspecific, while in the study of humans intraspecific competition between populations (Hardesty 1975), different cultural groups or other social units (Love 1977) is examined.

Natural biogeography deals with populations of different species. The fact that human populations can compete against each other and are intraspecific groups may improve or expand biogeographic theory, but need not inhibit its use in anthropology. The ecologist Diamond notes:

> I take intraspecific groups as units in considering man but take species as units in considering animals. This apparent difference may be an artifact of available information; if animal biogeographers had as much information about intraspecific variation in their favorite species it might be possible to illustrate some strikingly different distributional strategies by various populations of the same species, as can be done for man (1978:250).

Diamond (1978:258) also presents a model of a colonization cycle that applies to human and other species populations. The model has three phases; the first is an expanding phase triggered by an increased availability of resources made possible by an enviromental change or a "cultural or technological change," leading to niche expansion, an increase in niche breadth. Second is a local adaption phase during which the new enviroment is adapted to, and selection for self-regulation of abundance to conserve resources increases. In the final phase, niche breadth narrows as a population's niche contracts in response to increasing competition from closely related populations. Niche contraction also is likely to result from any reduction in important natural resources caused by natural enviromental change, breakdowns in social organization, or a host of other disruptions.

While the colonization cycle and its corrollaries offer exciting possibilities for the study of human biogeography and adaptation (Black 1978; Clark and Terrell 1978; Irwin 1978; Kaplan 1976; Kirch 1980b; Terrell 1976), the more general ideas about niche variability that are invoked by this and other biogeography theories probably have the greatest applicability to anthropology.

The insights of island biogeography and the colonization cycle also are useful independent of islands or colonization (MacArthur and Wilson 1967:3-4). Their value to this investigation is their suggestion of relevent niche dimensions and casual factors for the diachronic study of human adaptation through long-term niche dynamics. The hypervolume model of niche is a useful concept for describing and measuring the adaptation of a group. Although the fundamental niche is impossible to examine empirically, the concept has lead to fruitful examination of various dimensions of niche and the identification of generally important dimensions.

Niche and Cultural Adaptation-- A Summary

The two preceeding sections described and examined the usefulness of the concept of ecological niche for describing and analyzing the adaptive states of human groups and the process by which adaptive states change over time. Several anthropologists have used or suggested the use of niche explicitly in analyses of human adaptations.

From the studies described above and the work of natural ecologists, four primary guidelines can be drawn for the anthropological use of niche:

(1) A human niche is a multidimensional phenomenon. The analysis of a limited number of these dimensions relevant to the problem under study is the appropriate method for describing and examining the niche.

(2) Niche analysis is usually comparative. Comparisons can be made between the niches of two or more human groups, between the niches of one group at two or more different points in time, or using a combination of these two perspectives.

(3) Coping with competitors, which in the case of humans commonly would be other social groups pursuing similar ways of life, usually has an important effect upon a group's niche (see especially Diamond 1978). In analyses of single niches or comparisons among niches, therefore, constraints from and variations in

the social environment should be considered carefully.

(4) Quantitative analysis and explicit description and justification of the dimensions to be studied are important parts of contemporary investigations.

The next section of this chapter develops an operational definition for niche and prehistoric cultural adaptations. The definition is focused on southern New England, but may have applications in other places. Following this, the final sections of this chapter summarize current interpretations of the prehistory of southern coastal New England using the operational definition that is developed.

An Operational Definition for Prehistoric Human Niches

Successful analysis of niche requires that relevant dimensions are selected for study. Relevant dimensions are those along which a population or group is constrained by natural environmental factors or competes with other populations or groups. After the relevant dimensions are selected, measurements must be determined by which each dimension can be described and variation in it observed. The techniques of observation and measurement should be as quantitative as possible to facilitate analysis and comparison. Without quantification, niches of some populations and groups will not be distinguishable (e.g., MacArthur 1958; Diamond 1973; Pianka 1974).

Selection of relevant dimensions depends upon the situation being examined. Prehistoric human adaptation on outer Cape Cod, Massachusetts, is the specific subject for the analysis described in this study; therefore, the niche dimensions selected should be those expected to be sensitive to niche shifts related to natural or social environmental change during that time period and in that environment. Each dimension selected also will have to be measured using archeological data available in the study area. The types of available data need to be considered during the selection process. Some or all of the niche dimensions and measures developed here may be relevant to investigations of human niches in other places and times.

A thumbnail sketch of the period and setting illustrates the expected niche shifts and suggests dimensions that might be important for identifying, monitoring, and quantifying the shifts. The next section of this chapter examines the existing interpretations of prehistoric cultural adaptation in southern coastal New England in more detail.

Outer Cape Cod was used by human populations from about

9,000 B.P. onwards; however, no substantial remains dating prior to about 6,000 B.P. have been discovered. The density and frequency of sites seems to increase through time with the largest number assigned tentatively to the period ca. 1,000-400 B.P. Some time prior to 1,000 B.P. horticulture was incorporated into the economy (Dincauze 1974:50-51; Ritchie 1969:227; Snow 1980:300). The effect of this addition to economic activities is disputed. Between about 4,000 B.P. and the incorporation of cultivated plants, temporal variation in economic activities in southern New England is poorly known. Interpretations are qualitative and impressionistic, based upon either large numbers of sites for which data are sketchy (Dincauze 1974) or excavations of small portions of site areas for which detailed data are available (Ritchie 1969).

Some archeologists (e.g., Dincauze 1974; Snow 1980, 1981) have inferred population fluctuations between 4,000 and 400 B.P. Their inferences are based upon the frequency of sites dated to different periods during these 3600 years. Typically the sites are dated by the occurrence of different projectile point and pottery styles. The nature, cause and even the direction of the fluctuations are disputed (Barber 1979:230-232, 1983; Dincauze 1974; Snow 1980:253-257, 1981). One interpretation is that between roughly 4,000 and 3,000 B.P. two distinct human populations divided into two distinct cultural groups coexisted in southern New England (Dincauze 1968, 1974, 1975; Ritchie 1969).

In summary, the existing interpretations suggest that the outer Cape was the setting for a variety of fluctuations in economy, social organization, population levels, extra-local group relationships and inter-local group relationships. In order to determine the variations that did occur, three dimensions were selected to describe niches of prehistoric human populations using archeological data from the study area. Because temporal control is rather imprecise (see Chapter 8), the niches described are composites using data of similar, but not exactly the same, age.

Niche Dimensions

The interpretations of prehistory indicate that variations might have occurred over time in the kinds or percentage of different economic activities, the patterns of seasonal and spatial organization of activity locations and occupied areas and the extent to which cultural contact was maintained with nonlocal human groups. These three topics can serve as dimensions along which niche can be measured at least somewhat quantitatively. Admittedly, these three dimensions-- economic actvities, spatial and seasonal organization and external cultural contact-- do not measure the articulation between a population and its natural environment as directly as the dimensions of food, habitat, and time of feeding that are used frequently in natural ecology

(Schoener 1974). However, both economic activities and spatial/seasonal organization can be defined in ways that link them to environmental resources. External cultural contact is a dimension that can measure at least one aspect of articulation with the social environment.

Several of the recent applications of niche to the study of human adaptations have used niche dimensions that mimic the food, habitat, and timing dimensions of natural ecology more closely than the three dimensions named above do (Hardesty 1975, 1980; Kirch 1980a). However, Love's (1979) informative analysis of the niches of two distinct modern human populations in northern California reminds us that the concept of niche and niche dimensions can be expanded profitably beyond the realm of nonhuman species and natural environmental dimensions originally envisioned by Hutchinson. Indeed, given the generally poor archeological data base on prehistoric food resources, the identification of niche dimensions that can be measured without very specific information about prehistoric diet would be a substantial step forward. Perhaps this analysis will provide an additional payoff in this way. Next, the niche dimensions and measurements will be described in more detail.

Economic Activities: Economic activities are those associated with the procurement, manufacture, storage or use of goods important for survival. Important goods include food, tools and facilities. Both the type of activities and their integration are important. This dimension is measured by the kinds of activities represented and their integration. Variation in activitiies is measured by the frequency distributions of different artifact types, particularly chipped stone, food remains, feature distributions and fire-cracked rock distributions.

Two aspects of economic activities were used to describe this dimension: the activities themselves and their organization. Certain artifacts and other archeological remains frequently correlate with particular activities. Lithic artifacts, for example, indicate the kinds of lithic manufacturing or maintenance and use activities that occurred. The examination of use-wear on lithic artifact edges and surfaces has been an especially fruitful field in recent years (e.g., Hayden 1979; Keeley 1980; Odell 1980), although it was not a part of this analysis.

Other artifacts and remains reflect other kinds of activities. On the outer Cape, prehistoric ceramics, for example, seem to have been utilitarian tools (Childs 1982; Chapter 13 of this report), probably used mainly for cooking food, since an assortment of lighter weight and more durable containers of animal skin, bark, reed and grass were available for transportation and storage. As another example, the remains of fish, shellfish, mammals, and various floral species indicate activities related to their procurement and procesing for immediate consumption or storage.

The second aspect of economic activities examined was the extent to which activities were carried out independently or in concert. Plog (1974:99-116) showed that the integration of activities changed during the shift from Basketmaker to Pueblo culture in the Hay Hollow valley of Arizona. Activities were organized differently on either side of this transition. A change in the ways that activities were integrated could constitute a meaningful change in the niche of a human population. Integration was measured by the extent to which activities occurred in the same general vicinity at approximately the same time.

Spatial/Seasonal Organization: Spatial and seasonal organization, the second dimension selected, refers to the location(s) and the scheduling of activities. The spatial and seasonal arrangements of activity areas, dumps and habitation areas reflect the human choices made collectively and individually to cope with the natural and social environment. If a change occurred in the choices that were made, for example, if subsistence strategy were altered to include clearing and planting during the spring instead of spearing or netting anadramous fish, not only the activities, but also the loci of activites would change. Such a shift should be discernible in the archeological record. The variation and range of activities in sites and within larger spatial subdivisions of the study area were used to measure this dimension of niche. The measurement of seasonality, however, was possible only for those activities that occurred in concentrations for which season(s) of occupation were determined. This dimension is analogous to the dimensions of feeding time and feeding location that are used frequently by natural ecologists (e.g., Schoener 1974; Pianka 1978:247-267).

The spatial organization of activities was described by the frequency with which different activities or combinations of activities occurred in different or similar areas. The scale of analysis varied from the areas of sites, minor subdivisions of the study area, to major subdivisions of the study area (e.g., the sample strata), to the entire study area.

The seasonal organization of activities was determined by analysis of the season(s) during which remains that indicate different activities and combinations of activities were deposited. The means of identifying the seasonality of remains for this analysis was the analysis of growth lines in *Mercenaria mercenaria* shells from within concentrations (Chapter 12 of this report).

External Cultural Contact: The third dimension used here was referred to as external cultural contact. The intended use of this dimension was to measure the extent of interaction between human populations occupying the outer Cape and nonlocal groups. The possibilities of various population fluctuations and intergroup competition or cooperation, based upon existing interpretations of prehistory, make this dimension relevant. Temporal changes in this dimension, depending upon their characteristics, might reveal the nature of extralocal/local relations. Measurement of contact with extralocal groups was based upon the frequency and uses of nonlocal lithic raw materials. Other goods probably also were exchanged, but these have not survived in the archeological record.

The extent of cultural contact and interaction, sometimes referred to as social distance, among contemporaneous, but relatively distinct, human populations on the outer Cape, and between outer Cape populations and the inhabitants of other parts of southern New England or beyond is an important aspect of cultural adaptation. Exchange relationships with non-local groups can be a kind of insurance for a group against a local ecological disaster, or may even be used to maintain a particular adaptation when local conditions deteriorate slightly and temporarily (Braun and Plog 1982; Vayda and McCay 1975; Waddell 1975). This dimension could be investigated at both local and regional scales.

The local scale could be examined by attempting to discern whether stylistic differences in projectile points or pottery types existed between occupations geographically separated but temporally similar. Kay (1975, 1979) has had some success identifying and characterizing social distance among local Hopewell groups in central Missouri with such an approach.

The dimensional analysis presented here, however, focuses on extralocal cultural contact. Contact and interaction between outer Cape and more distant social groups was measured using frequencies of exotic lithic raw materials. The extent of interaction was inferred from the frequencies of exotic lithic types.

Current Interpretations of Prehistoric Cultural Adaptations on the Southern New England Coast

In the preceding sections of this chapter it was argued that the concept of ecological niche could be useful for describing and analyzing important aspects of human cultural adaptations. One of the useful aspects of the modern niche concept is that the important dimensions of niche are made explicit and measurable. This makes it particularly easy to compare the adaptations of different populations when similar dimensions have been studied and similar measurements used. Even when similarities do not exist, the explicitness with which the niche dimensions are defined should enable one researcher to probe the interpretations and data sets of another in order to construct a reasonably detailed and comparable picture of the other cultural adaptation in question. The importance of this is that the comparison of cultural adaptations from different time periods and locations is facilitated.

The task of this section is to review current interpretations and recast them in light of the niche dimensions and their measurements described in the preceding sections of this chapter. This section is organized around the niche dimensions, and chronologically within the discussion of each dimension. This organization, rather than a more traditional chronological recapitulation, was used to emphasize the niche dimensions and to help identify temporal variation related to each dimension. This section reviews previous results from coastal southern New England, and in some instances from other parts of the Northeast coast. Because the Cape Cod data are sketchy at best for time periods prior to the Late Archaic, comparisons will be limited to this and subsequent periods, except for the following brief description of earlier prehistory.

The Paleoindian, Early Archaic and Middle Archaic Periods

These three temporal periods stretch from approximately 12,000 to 6,000 B.P. Few remains on the outer Cape can be linked directly to them. The evidence for human occupation and use of the area during these early times is mainly projectile points that are stylistically similar to points in other areas that have been dated to this earliest span of human occupation. The statewide inventory of archeological collections has identified 69 points dated to these early time periods on Cape Cod, Martha's Vineyard, and Nantucket (Massachusetts Historical Commission [MHC] 1981:3-6). Nine of these are Paleoindian, six Early Archaic and 54 Middle Archaic. These are extremely small numbers of points compared with the 2619 Late Archaic points counted for the same area (MHC 1981:7-8).

The paucity of dated artifacts suggests that the outer Cape was occupied and used relatively lightly during the earliest prehistoric time periods. It is possible, however, that human populations during these periods were actively and intensively using parts of the Cape that subsequently eroded or were submerged by rising sea level. As an example, Barber (1979:210) has pointed out that along the lower Hudson River, an area that was available for occupation during the early time periods and not subsequently submerged, shellfish exploitation sites have been discovered that date to the Middle Archaic period (Brennan 1981).

During the past decade more attention has been paid by archeologists to these early time periods, particularly the Early and Middle Archaic (Dincauze 1971, 1976; Dincauze and Mulholland

1975; Starbuck and Bolian 1980). A closer look at old data coupled with some new data has resulted in the reinterpretation that, in general, southern New England was more densely occupied and more heavily used than had previously been thought.

It is possible that currently undiscovered remains from these periods exist within the area investigated by the survey, but if so, they are very rare. The statewide archeological collections inventory identified six Middle Archaic points from four site areas in Wellfleet and Truro (MHC 1981). Further analysis of the collections from these sites, as well as additional field examination in the site areas themselves probably would be helpful for understanding the human use of the outer Cape during at least the latter portion of these early time periods. Collections analysis plus limited site examination, for example, have provided a clearer recognition and interpretation of Middle Archaic occupation and use of Martha's Vineyard (Richardson 1983).

The Late Archaic and Woodland Periods

The survey investigation area, and, by inference, Cape Cod in general, was occupied and used intensively for the first time during the Late Archaic (4,000-2,600 B.P.), a pattern that also holds in nearby Martha's Vineyard (Richardson 1983:9, Ritchie 1969:213), and for much of southern New England (Barber 1979:230-232).

Some archeologists distinguish two different cultural traditions for part of the Late Archaic period: (1) the Small Stemmed point, or "Narrow-point" tradition (Dincauze 1974:47-48;1975), referred to by Ritchie (1969:215-224) as the Squibnocket phase or complex, and (2) the Susquehanna tradition (Dincauze 1974:49; Ritchie 1969:219-224; Turnbaugh 1975). Dincauze and Ritchie interpret the different cultural traditions as representing different, mutually exclusive human populations. Dincauze (1974:47,1976:126-130) hypothesizes that the prehistoric populations that were associated with each of these cultures coexisted throughout southern New England by following different ways of life, that is, exploiting different niches.

Snow (1980:223-259) also has recognized two archeological entities, but interprets them differently. He sees archeological manifestations of the Small Stemmed Point tradition or Squibnocket complex as the record of a particular way of life or adaptation that was roughly similar throughout southeastern New England, southeastern and central New York and portions of the Mid-Atlantic region during the early part of the Late Archaic (Snow 1980:223-230). His term for this widespread pattern is the Mast Forest Adaptation and he includes the Squibnocket Complex as a manifestation of it (Snow 1980:226).

Snow regards the Susquehanna tradition as a widespread distribution of one particular tool type, rather than a group of interrelated cultural traits. Following Cook (1976), he concludes that "...the widespread distribution of Susquehanna and other broad projectile point types was the consequence of a minor technological innovation that was adopted by a variety of local cultures .."(Snow 1980:246-247).

The results of Barber's (1979:216) analysis of site distributions and characteristics throughout southern New England seem to support the interpretations of Snow and Cook. He notes that the settlement patterns associated with sites of either tradition are not substantially different. On the other hand, one conclusion of a recent field survey project in the lower Connecticut River Valley (McBride and Dewar 1981:48-49) is that Small Stemmed tradition components and Susquehanna tradition components have very different spatial distributions, perhaps indicating that the different traditions are related to different ways of life, as Dincauze suggested.

Dincauze (1974:49) defined the Orient phase for the last 500 or so years of Late Archaic (ca. 3000-2500 B.P.). She interpreted this phase as the result of the combination of the Small Stemmed and Susquehanna traditions, as well as a blend of their different adaptations. On Martha's Vineyard, Ritchie (1969) did not distinguish this phase.

The time periods that follow the Late Archaic have received the least attention from New England archeologists although this is changing (eg., Barber 1982a; Luedtke 1980, 1983). The period between about 500 B.C. and European contact, around A.D. 1500, is referred to traditionally as the Woodland period. It is divided into three segments: Early, Middle, and Late. Snow (1980) recently has devised new designations. He terms the period 700 B.C. to A.D. 1000 Early Horticultural and refers to the balance of prehistory as the Late Prehistoric period.

Whether one uses the traditional or the new names for the post-Late Archaic time periods, the interpretations of adaptations and chronological associations of artifact types are very similar in all current interpretations, as the following sections of this chapter will demonstrate. There are no current controversies regarding large population movements or coexisting cultural traditions for time periods following the Late Archaic.

The following sections describe the current interpretations of southern New England prehistory in terms of the niche dimensions described in preceding sections of this chapter. Temporal variation, or lack of it, for each dimension are the focus of each discussion.

Economic Activities and Organization:Archeologists have only very general notions of the activities that were carried out by prehistoric New Englanders. We know that they hunted, fished, collected shellfish, cultivated plants during the later periods and gathered wild plants for food, as well as for clothing and for the manufacture of tools and shelter. The relative frequency and details of these activities are learned from study of the archeological record only with great effort. A number of such efforts have been made or are underway currently in southern New England, but at present this type of information is very scarce (Dincauze 1980:30).

In order to learn more about how activities were carried out, detailed analysis of the behavior that occurred at specific sites or subsite units is needed. Barber (1982a) provides a recent example with his analysis of the specialized shellfish procurement at the late Middle Woodland Wheeler´s site. To improve the understanding of the relative frequencies with which various activities were conducted, better estimates of the frequencies of archeological remains that reflect specific activities are necessary.

Present interpretations of Late Archaic economic activities unanimously indicate a wide range of subsistence pursuits including hunting, shellfish collecting, fishing and the gathering of wild plants (Dincauze 1974:48; Ritchie 1969:215-216; Salwen 1965:160; Snow 1980:161-162). There does seem to be, however, a question of how these activities were organized. Salwen argues that the exploitation of different resources was carried out in different places. He states the Archaic subsistence pattern, based as it was upon the exploitation of many of the food resources of the environment rather than concentration upon a selected few, resulted in the creation of different kinds of sites, each appropriate to its purpose, and each containing a somewhat different archeological inventory (Salwen 1965:161).

This spatial differentiation indicates that activities, at least subsistence activities were conducted independently, at different kinds of locations. Snow concurs with Salwen´s interpretation, describing the Late Archaic Mast Forest adaptation as "very diffuse" involving a wide range of subsistence foods and activities. His interpretation also is that subsistence resources were procured from sites in a variety of locations (Snow 1980:230-231).

Dincauze similarly infers a "...well-balanced adaptation to major resources...[and] a broad-spectrum exploitation strategy" (1974:47-48)" in the Boston basin area during the Late Archaic. She does not address the question of activity organization directly, although she does note the wide diversity of locations associated with the Small Stemmed point tradition sites. One could infer from this that Dincauze sees a pattern like that proposed by Salwen with different activities carried out at different locations. Dincauze (1974:48), however, also attributes "specialization within smaller territories" to the Small Stemmed tradition. If group territory was small, it is possible that different subsistence activities might have been based in a single location.

On Martha's Vineyard the Late Archaic economic activities inferred by Ritchie (1969:215-216) are similar to those listed above. In addition, he believes that fishing was less important than terrestrial or marine hunting and shellfish collecting. The contents of Ritchie's Late Archaic components, however, suggest a greater integration of economic activities than proposed by Salwen and Snow.

Ritchie (1969) describes two Squibnocket Complex components (Stratum 2 at the Hornblower II site and Stratum 3B at the Vincent site) and two mixed Susquehanna/Squibnocket components (Stratum 2 at Hornblower II and Stratum 3A at Vincent) all of which contain remains linked with terrestrial hunting, marine hunting, shellfish gathering and fishing. In other words, a variety of subsistence activities appear to have been carried out from the same site area. There are two other Late Archaic components without such diverse remains, Stratum 3 at the Howland #1 site and Stratum 3 at the Peterson site, suggesting that some kinds of activities were conducted in separate locations, or that at some times various activities were done separately.

Ritchie's data suggest that different subsistence activities were more integrated than is inferred by the other investigators. The procurement portion of terrestrial hunting and shellfish collecting occur in different locations, however, at least part of the food processing associated with these activities occurred in a common area or adjacent areas, and the refuse from the processing was dumped in the same place.

This pattern is different from the one described by Salwen (1965) and Snow (1980). In part the difference may be more apparent than real due to the different interpretive spatial scale between Martha's Vineyard and the regionwide focus of the other two. Alternatively, the Martha's Vineyard pattern might reflect the fact that southern New England coastal locations typically had easy access to a wide range of marine and terrestrial resources. Exploitation of many different resources from a single location may have been feasible on the coast, while it was not inland. The resource richness of temperate latitude coastal environments has been suggested in recent essays by Perlman (1980) and Yesner (1980).

For the Late Archaic, then, a wide range of subsistence activities generally is agreed upon, but the organization of these activities might have been different in different environments within the region. The relative frequencies of these activities has not been assessed adequately. In addition, there are other economic activities, such as the Late Archaic procurement, manufacture and maintenance of tools that have not been addressed in detail, although this is changing (Barber 1981).

The disagreements regarding the interpretation of the Small Stemmed tradition and Susquehanna tradition do not extend to interpretations of activities or their integration during the Late Archaic. Dincauze has not described the different ecological niches or cultural adaptations that she suggested as the mechanism for coexistence of groups from differing cultures. Neither does Turnbaugh (1975) describe convincingly different niches for the local population and the intrusive populations of Susquehanna tradition-bearers that he interprets for this period (Cook 1976).

The same general pattern of subsistence activities and organization persisted during the Early and Middle Woodland periods. The major difference in subsistence activities was the introduction of horticulture. All present interpretations describe this introduction and the growth of cultivation for subsistence as very gradual. Even during the Middle Woodland, Ritchie (1969:227) describes the subsistence activities as reflecting mainly a hunting-fishing-gathering economy.

There is general agreement that shellfish collecting became a more important activity after the Late Archaic (Dincauze 1974:50; Ritchie 1969:226; Snow 1980:234). Snow (1980:286) also suggests that coastal shellfishing began to be linked with nearby corn cultivation during the Woodland period. He interprets both these as mainly or exclusively summertime activities. Regional experts admit, however, that very little is known about the Early and Middle Woodland periods (e.g., Dincauze 1974:50,1980).

There is evidence for some specialized intensive food procurement activities during the Middle Woodland. Barber's (1982a) recent analysis of the Wheeler's site is a convincing, detailed arguement that its main function was as an early autumn shellfish procurement and processing station. Another analysis by Barber (1982b) of a large Middle Woodland feature at the Rivers site in northwestern Vermont suggests another type of specialized activity during this period, the communal mass hunting of deer, an activity known to have occurred during the early historic period throughout the Northeast.

During the Early and Middle Woodland periods, roughly 500 B.C. - A.D. 1000, the range of economic activities expanded to include activities required by horticulture and the relative frequencies of activities must have shifted as the proportion of subsistence based on domesticated foods became more substantial. There is a strong tradition of interpretation, extending back to Caldwell's "primary forest efficiency" (1958, 1962), that the addition of horticultural activities to cultural adaptations in prehistoric eastern North America caused little or no change in the existing adapations. What, if any, shifts occurred, and their impact on activity organization is hardly even hinted at in current interpretations, but the integration of activities may have increased. The generation of food surpluses by mass procurement and processing activities (Barber 1982a,b), as well as horticulture, could have made stored food supplies and sedentary settlement more widely possible. A central base of operations would very likely have resulted in greater activity integration, such as was inferred about the Late Archaic components in Ritchie's Martha's Vineyard sites.

The pattern of activities that evolved through the Early and Middle Woodland periods is interpreted as having persisted during the Late Woodland and into the Contact period, with horticulture continuing to increase in importance (Dincauze 1974:55; Ritchie 1969:228; Salwen 1978; Snow 1980:76-79, 335). Particular resource procurement and processing activities probably were carried out at special purpose camps in different locations (Luedtke 1980:71-73; Salwen 1978:164-166; Snow 1980:79), but some processing and all the long-term storage probably occurred in sedentary settlements. This pattern, similar to the one inferred for the Late Archaic on Martha's Vineyard, seems to have become prevalent regionally in southern New England during the Late Woodland.

Briefly, along the northern New England coast, as represented by work in Maine during the past decade, there seems to have been a general pattern of a wide range of activities, at least in the case of subsistence activities, similar to the southern New England pattern, except for the lack of horticulture during the later time periods (Sanger 1982:199-202). Spiess, et al. (1983) interpret shifts in the subsistence resources emphasized between prehistoric periods, implying perhaps a shift in activities, and perhaps activity organization from Late Archaic through Late Woodland.

The Spatial and Seasonal Organization of Activities: Current interpretations of prehistory include discussions of spatial and seasonal organization that are even more general than those just reviewed about economic activities.

For the Late Archaic most interpretations posit that a variety of locations were used and that particular types of environments were linked functionally to specific activities. Furthermore, both the particular environments and specific activities were linked to different times of the year (Salwen 1965:161-168; Snow 1980:230). Salwen distinguishes two major types of locations in coastal areas of the Northeast with different functional and seasonal characteristics: "the cold weather 'inland' hunting camp... and the warm weather 'coastal' hunting-fishing-gathering camp" (Salwen 1965:161-162). Two other site types, linked to specific kinds of locations were "spring fishing" and "specialized shellfishing" stations (Salwen 1965:163). How widely separated in space the inland and coastal camps were is not explicitly addressed by Salwen. Several of his examples of inland camps are located in North Truro on the outer Cape, however, and cannot have been over two miles distant from either the Atlantic Ocean or Cape Cod Bay during the Late Archaic.

Snow seems to infer a lengthier separation between summer and winter settlements, mentioning winter camps "in back country" (Snow 1980:230). It is impossible to know with certainty what is implied, though, because his focus is regional and general. Clearly Late Archaic populations occupied and used areas far from the coast from sites such as the Neville site on the Merrimack River in New Hampshire (Dincauze 1976:124-128) and Flagg Swamp Rockshelter in Massachusetts (Huntington 1982). The question seems to be, was the same population occupying both the far inland and coastal areas?

Salwen's interpretation of Stratum 1 at Small's Swamp, Stratum 1 at Holden site and Stratum 1 at the Rose site, all in North Truro on the outer Cape, as cold weather "inland" camps suggest that by the Late Archaic locally based groups resided year round on the outer Cape. The interpretation of year round occupation on the southern New England coast is supported by faunal remains from several of the Late Archaic components among Martha's Vineyard sites (Ritchie 1969:46, 152, 201). Ritchie in fact concludes, that at least some individual coastal settlements were occupied year round.

> ...The normal inland seasonal cycle of subsistence activities of the Archaic groups, involving the use of different site locations convenient to particular food resources, seems on the evidence of the food remains and artifacts, to have sometimes been abandoned in favor of perennial residency at a single suitable site location having an abundance of shellfish nearby. (Ritchie 1969: vii)

Ritchie alone among the archeologists cited in this chapter infers year round occupation of individual site locations as early as the Late Archaic. His site data regarding seasonality, however, are far more detailed than those that Salwen (1965) had available. In addition, the question of seasonality of coastal settlements was peripheral to Salwen's thesis regarding shellfish use. Snow's description of seasonality and settlement pattern are from a regional perspective and do not treat coastal settlement specifically.

Interpretations of spatial and seasonal organization for the Woodland period recount patterns tending increasingly toward sedentary settlements. The only detailed treatment of these topics for the Early and Middle Woodland also comes from Martha's Vineyard (Perlman 1977). Perlman, however, differs from Ritchie by inferring a pattern of seasonal shifts in settlement locations timed according to resource productivity and availability. He hypothesizes five different types of sites as part of a seasonal round between 1000 B.C. and A.D. 1000. He differentiates the types by location and season of occupation or use. The types include: noncoastal winter sites in "protected locations", upland food gathering sites, shoreline fishing sites used during the early spring and summer, late spring or late summer dispersed fishing and seal hunting sites, and winter or summer hunting components (Perlman 1977:144-150).

The Late Prehistoric or Late Woodland (A.D. 1000-1600) and Contact periods are interpreted as having had a similar, though more sedentary, pattern with subsistence activities differentiated by location and season (Dincauze 1974; Salwen 1978; Snow 1980). Snow (1980:75-79,335) infers three types of sites: a main village, occupied with varying intensity throughout the year, "farmsteads" used intermittently between April and October, and temporary resource procurement stations used for short periods throughout the year to exploit different food resources. Salwen (1978:164-166) infers a similar pattern for the Contact period.

In addition, settlement pattern analysis for several areas in the Connecticut River Valley, its adjacent highlands and parts of Rhode Island agree with these general patterns (Feder 1981b; McBride and Dewar 1981; Robinson 1981; Wadleigh 1981). For the northern New England coast, Sanger´s recent summary of Woodland period components indicates a spatial and seasonal organization of activities that was flexible with a wide range of options available. He notes:

> It is now evident that coastal occupation does not automatically imply a particular season. The Passamaquaddy Bay sites reported here evince winter occupation. Possibly more exposed outer island sites would reveal summer sites. Fernald and Frazer Point reflect colder seasons, while Turner Farm seems to be a year-round station. The Boothbay research is revealing summer and winter residency in preliminary analysis (Sanger 1982:202).

Based upon their analysis of sites along the central Maine coast on Penobscot Bay, especially Turner Farm, Spiess, et al. (1983:91-101) infer a similar wide range in the spatial and seasonal organization of activities. Their interpretation includes the determination that the Turner Farm site was occupied year round during the Late Archaic ". . . though fluctuations in group size and brief periods of abandonment are probable (Spiess, et al. 1983:103-104)."

Ceci (1979, 1982) recently has argued for a "new paradigm" for the interpretation of prehistoric coastal settlement systems in the Northeast. Put succinctly, she posits sporadic summer use of the coast until European contact about A.D. 1500, after which large sedentary villages began to occur there (Ceci 1982:7-8). Trade with Europeans and the specialized manufacture of wampum are the causal forces to which she attributes this settlement reorientation. Prior to Contact, Ceci sees very limited types of activities and only summer occupations along the coast.

Although there are very few detailed seasonality analyses of site assemblages (e.g., Barber 1982a; Hancock 1982; Huntington

1982; Luedtke 1980:62-63), current interpretations are of a complex spatial and seasonal organization of activities.

External Cultural Contact: External cultural contact is the third and final niche dimension discussed here. It is a less than fully satisfactory term by which is meant the extent to which a local population was part of an active widespread social network. Such a network could be an important component of an adaptation. The information and resource exchanges this kind of network would be capable of could allow local populations to experiment more with local adaptations, for example, by specializing in a particular kind of subsistence resource extraction, knowing that a disastrous failure could be weathered by using resources supplied through extralocal exchange.

Social contact, communication and information exchange, unfortunately, are not easily or clearly recognizable in the prehistoric record. In the present case, however, it is possible to search the record for durable material remains that indicate some kind of long distance contact. Exotic lithics, such as New York State cherts and jasper that may be from Rhode Island, New Jersey or Pennsylvania, occur in some of the assemblages. Certainly, the exotic lithics were only a part of the contact. Unfortunately, any individuals, perishable goods and information that also may have flowed through such a network will not be discovered easily, at least not by contemporary archeological means.

Current information and interpretations about prehistoric intergroup contact are yet more scarce and sketchy than for the other two dimensions addressed already. The nature and extent of intergroup contact during the Late Archaic is entwined with the controversy of the cultural significance of the Small Stemmed and the Susquehanna traditions. The traditions are interpreted, on the one hand, as evidence of two sets of culturally distinct populations with minimal communication and exchange between them (Dincauze 1974:47, 1975; Ritchie 1969:219; Turnbaugh 1975). In addition, the extensive use of local lithic materials by groups of the Small Stemmed Point tradition might indicate limited extralocal communication and exchange networks, perhaps delimited by watersheds (Dincauze 1974:47, 1975:25).

The competing hypothesis about Late Archaic intergroup contact, however, would, if correct, imply the opposite about communication. Snow (1980:246-248) and Cook (1976) interpret the spread of broad projectile points associated by others with the Susquehanna tradition as the result of the diffusion among local groups of a "minor technological innovation." A widespread network for at least the communication of ideas must have existed for such an innovation to be passed along.

The broad projectile points of the Susquehanna tradition occasionally were manufactured from an exotic lithic material, but typically were of local lithic materials. This is not the case for at least some of the projectile points associated with the Early and, especially, the Middle Woodland periods. Many sites throughout southern New England that were occupied during the Middle Woodland period contain relatively high frequencies of exotic lithics. At the Wheeler's site in northeastern Massachusetts, for example, 17.4% of the debitage by weight was jasper, probably from sources in Pennsylvania (Barber 1982a:51-52). Luedtke (1975:128) reports similar cases from the Boston Harbor Islands as does Dincauze (1974:51) from sites in the Boston basin. Among the Woodland remains at the Neville site in New Hampshire were noted an "increasing diversity of lithic raw materials, and some few western styles of ceramic vessels implying greater complexity in communication networks" (Dincauze 1976:134). Finally, at the Loomis II site in Connecticut the same association of exotic lithic material with the Early and Middle Woodland period is reported also (Feder 1981a:196-197).

This pattern of exotic lithic material use suggests long distance contacts with possible concomitant communication and exchanges. The pattern does not extend into the Late Woodland period, however. During that period local materials once again provide the vast majority of lithic tools and debris. Based upon her survey of sites, collections and records for the Charles River basin, Dincauze concluded that:

> By the time of European contact, the older Archaic pattern of river basin territoriality had been reestablished...Raw material distributions with drainage basin limits reappear (Dincauze 1973:41).

The general pattern suggests a much higher level of contact and communication during the Middle Woodland than in any of the other periods.

Summary

This chapter aimed to cover many bases. It described and justified the theoretical orientation and method that have served to organize the description and especially the interpretations of much of the data presented in this report. It developed a promising operational definition for prehistoric cultural adaptations in the southern New England region and pehaps elsewhere. Finally it presented a summary of current interpretations of regional prehistory using the niche dimensions developed for this study. The discussions about each dimension were organized chronologically so that temporal variation in the dimensions would be more easily recognized. Chapter 16 of this report describes how the survey data conform to or contradict these interpretations.

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CHAPTER 6

The Ethnohistory of Outer Cape Cod

Susan A. Chase

Introduction

Native Americans in New England may have first encountered Europeans about the year A.D. 1000, when the Viking Leif the Lucky sailed southwest from Greenland and discovered "Vinland." After the brief, abortive attempt to settle Vinland, North Atlantic voyages did not become common until the late thirteenth century when French and English fishermen frequented the waters near Iceland (Howe 1969:6). Still later, when economic interests expanded beyond fishing to include furs, whales, and finally potential sites for colonization, the exploration of more southerly latitudes began in earnest. Fortunately, some of the later explorers wrote detailed descriptions of their voyages. These historic accounts provide a unique and vital source of information about North American Indians at the end of the Late Woodland period. However, it is important to distinguish earlier reports which reflect Indian adaptation to the original environment from later accounts, which record native cultures whose economic, political, and social structures were already influenced by European culture (Bourque 1973:3, 10; Sanger 1979:112, Brasser 1978:83,84). In southern New England, dramatic culture change occurred simultaneously with the establishment of permanent colonies. This section will summarize the major historic accounts written prior to the settlement of Plymouth in 1620, focusing primarily on those relevant to Cape Cod and southern New England. Where possible, the reliability of the source material and the reputation of the observer will be noted. Finally, an attempt will be made to evaluate the impact European culture had on native North American lifeways in the Late Woodland/Early Contact period.

Early Explorations and Contacts in New England and Canada

After the Norse sagas, the earliest extant reference to native North Americans is a brief observation made following the 1497 voyage of Englishman John Cabot. Lorenzo Pasqualigo, a contemporary, states that Cabot found "certain snares which were spread to take game ... , a needle for making nets, and ... certain notched birch trees [by which] ... he [judged] that there are inhabitants" (Williamson 1929:29). Cabot´s description of the abundance of fish, and his fanciful opinion, noted by Raimondo de Soncino, that "brazil wood and silk are native there" (Williamson 1929:30), doubtless were influential in persuading other adventurers and merchants to attempt the North Atlantic passage.

The Portugese nobleman, Gaspar Corte Real, made voyages to the Newfoundland area in 1500 and 1501. Little is known of his first voyage, and his ship never returned from the second. However, two ships accompanying him returned to Lisbon with the first description of the natives of North America. This description, as recounted by Corte Real´s contemporaries Alberto Cantino and Pietro Pasqualigo, the Venetian ambassador to Portugal, follows:

> The country was very populous. The inhabitants lived in houses constructed with timber of great length, and covered with fresh skins ... the natives ... were all well formed, somewhat taller than our race, with long, flowing locks, and painted their faces like Indians ... They are clothed with the skin of different animals ... they [live] ... by hunting and fishing (Harrisse, 1961:65-70).

Cortereal´s two companion ships brought 57 natives back to Lisbon. Pietro Pasqualigo wrote of these captives:

> In their land there is no iron ... [and] yet these men have brought from there a piece of a broken gilt sword, which certainly seems to have been made in Italy. One of the boys was wearing ... two silver rings which without doubt seem to have been made in Venice ... (Williamson 1929:40).

This description of metal objects indicates that some form of Indian-European trade (or gift-giving) was occurring in the Newfoundland area by the beginning of the sixteenth century.

These incidents initiated a long series of European kidnappings which had a dual impact on the native population. One obvious result was the establishment of a distrust of Europeans and a desire for vengeance. A second, less immediate and more subtle effect, was the introduction of the captured natives to European civilization. Some of these Indians (e.g., Epanow, Squanto) later returned to their homelands, where they served as interpretors in trade transactions, and quite possibly introduced their villages to European customs. It is not the introduction of individual culture traits that is of primary concern here, but rather the changes that adoption of such traits may have wrought in native ways of life. Where these are documented in the historical record, they will be noted here.

Additional early interactions between Natives and Europeans must have occurred, for Howe reports that by 1517 there were fifty Castilian, French, and Portugese vessels fishing off Newfoundland. Unfortunately, we have no written records of any encounters between the men of these vessels and the Indians of the area (Howe 1969:9). However, recent archeological data attests to the presence of Europeans in Labrador during this period (Tuck and Grenier 1981:180). Although it is impossible to ascertain exactly the southern limit of the fishing and whaling expeditions, the available evidence suggests that such activities were pursued most intensively off the southeastern Canadian coast.

Early Explorations of Southern New England and Earliest References to Cultivation

The first account of Southern New England, including the earliest reference to cultivation in North America, was made by Giovanni da Verrazzano in 1524. Verrazzano, travelling up the coast from the Carolinas, spent fifteen days along the coast of present day Rhode Island, principally in Narragansett Bay. He was struck by the appearance and manner of the Indians there, whom he considered "the most beautiful and ... the most civil ... that we have found on this voyage" (Wroth 1970:138). He described their dress of deer and lynx skins, their long braided hair, and ornaments of stone and worked copper. Among the Indians were

> two kings ... dressed thus: the older man had on his naked body a stag skin, skillfully worked ... with various embroideries; the head was bare, the hair tied back with various bands, and around the neck hung a wide chain decorated with many different colored stones. The young man was dressed in almost the same way. (Wroth 1970:138)

The description of the stone necklace suggests that wampum, later highly prized and often used for ornamentation, had not yet become a high-status item in the area.

Verrazzano has given us a first glimpse of native social structure; the existence of "kings" may indicate social stratification. The identification of social stratification depends on the accuracy of Verrazzano's observation. It also presumes that these chiefs were permanent leaders, rather than temporary ones, appointed for the specific task of greeting the Europeans. In 1606 Champlain stated that the Chatham Indians had "chiefs whom they obey in regard to matters of warfare but not in anything else" (Champlain 1922:413). However, many later seventeenth century accounts recognize the existence of stratification in southern New England, and assert that the position of chief, or sachem, was a hereditary one.

The Indians encountered by Verrazzano were unused to Europeans. This is demonstrated by their fearful reaction to the arrival of the Europeans, and their apparent unfamiliarity with the trinkets proffered. While the Indians coveted small bells and blue crystals,

> they did not appreciate cloth ... the same was true for metals like steel and iron, for many times when we showed them some of our arms, they did not admire them... but merely examined the workmanship ...; [mirrors] they would look at ... quickly, and then refuse them, laughing (Wroth 1970:138).

During their two week stay, Verrazzano and his men "frequently went five or six leagues into the interior, and there the fields extend for 25 to 30 leagues; they are open and free of any obstacles or trees ..." (Wroth 1970:139). The openness of these fields may be early evidence of the Indians' practice of firing of the fields and woods, which was observed by many seventeenth century explorers and settlers (Day 1953:330-335).

Verrazzano described the available natural resources the Indians' snares, bows, arrows and dug-out canoes. He reported that their houses were

> circular in shape, about 13 to 15 paces across, made of bent saplings ... [which] are covered with cleverly worked mats of straw which protect them from wind and rain ... They move these houses from one place to another according to the richness of the site and the season (Wroth 1970:139).

This is the earliest description of the round house, and of transhumance being practiced by the Indians of southeastern New England.

Of Indian subsistence, Verrazzano wrote:

> They live on the same food as the other people [to the south] - pulse (which they produce with more systematic cultivation than the other tribes, and when sowing they observe the influence of the moon, the rising of the Pleiades, and many other customs derived from the

ancients), and otherwise on game and fish (Wroth 1970:139).

Verrazzano left the area May 6th, 1524, so it's quite possible that he actually witnessed the sowing of crops. His descriptions of the Indians' appearance, material culture and subsistence activities are substantiated by numerous later accounts. He appears to have been a careful and accurate observer. This opinion is expressed by Wroth, although he cautions that Verrazzano exhibited a "weakness for overstating size and distance" (Wroth 1970:87). Wroth also shares Penrose's opinion that "[Verrazzano's] account is the most accurate and the most valuable of all the early coastal voyages that has come down to us" (Wroth 1970:146).

A contemporary account of an exploration which may have included southern New England is Oviedo's report on the voyage of Estevam Gomez, in 1524-1525. Gomez apparently explored the coastline between Cuba and southern Newfoundland. Making a landfall between 40 and 41 degrees latitude (northern New Jersey to extreme southwestern Connecticut), he abducted "several Indians," whom he brought back to Spain. Oviedo's report states that "they are great archers, and wear skins of wild beasts ... The country contains ... fine fur-bearing animals ... They have silver and copper, as they gave to understand by signs. They worship the Sun and Moon ..." (Harrisse 1961:232-240). Since silver was unavailable to New England Indians prehistorically, its mention may be an allusion to European trade goods. Or perhaps there was a misinterpretation of the "signs" involved. Judging from later accounts (Gookin 1792:154; Marten 1970:23,24), the assertion that the Indians worshipped the sun and moon is also inaccurate.

The first actual landfall on Cape Cod for which we have a written record is that of prospective colonizer Bartholomew Gosnold, nearly eighty years later (McManus 1972:92). This voyage was documented by John Brereton and Gabriel Archer, members of the expedition. There had obviously been a number of contacts between New England natives and Europeans in the interim, however. This was dramatically demonstrated before Gosnold even reached Cape Cod, when he encountered "six Indians in a Baske-shallop with mast and sail..." off the New Hampshire coast (Winship 1905:34). These Indians had numerous articles of European origin, and they indicated "by some words and signs ... that some Basks or [some men] of S. John de Luz, have fished or traded in ... [that] place" (Winship 1905:34).

Sailing south, on May 15, 1602, Gosnold's crew found themselves "imbayed within a mightie headland." Five crew members made a landing there (in the Provincetown area), where they had a brief encounter with a "young [Indian] man of proper stature, and of a pleasing countenance" (Winship 1905:35,37). Archer adds that the Indian came "with his bow and arrows, and had certain plates of copper hanging at his ears" (Archer

1843:74). Meanwhile, the rest of the crew busied themselves with fishing. In five or six hours, they had caught so much cod that some had to be thrown back (Winship 1905:35).

Next day, Gosnold sailed along the outer Cape, naming two promontories along the present Nauset Beach area Points Gilbert and Care. Passing these, "shoal water delayed the party for several days, and they spent a good deal of time bartering with the Indians [in the Chatham area]" (Howe 1969:59). Archer found these Indians to be "more timorous than those of Savage Rock, yet very thievish." They came to the Europeans in canoes, and had "tobacco and pipes steeled with copper, skins, artificial strings and other trifles to barter." One of the Indians had a painted face and feathers in his hair. Another Indian had a "[breast] plate of rich copper ... the ears of all the others had pendants of copper" (Archer 1843:75). Copper is not native to Cape Cod, so these articles must have been obtained by trade, although it is unclear from this description whether these particular ornaments were of Native or European manufacture. A few days later, when Brereton asked the Indians of Cuttyhunk the source of their copper, they indicated that it came from a hole in the ground, and pointed toward the mainland (Winship 1905:44).

Gosnold continued south, exploring Martha's Vineyard, Nantucket and the adjacent islands, and finally chose Cuttyhunk as a likely settlement site. The wide variety of natural resources available in that location were enumerated by Brereton (Winship 1905:39-43, 48-50). While his crew began work on a fort on Cuttyhunk, Gosnold made short explorations in a shallop. On May 30, 1602, the English stole a canoe from Indians on an islet north of Elizabeth's Island. The following day Gosnold went ashore on the mainland where

> immediately there presented unto him men, women and children, who, with all courteous kindness entertained him, giving him certain skins of wild beasts, which may be rich furs, tobacco, turtles, hemp, artificial strings colored, chains, and such like things as that instant they had about them (Archer 1843:78).

A few days later fifty Indians, including a sachem, came to Martha's Vineyard, where they feasted the English with roasted crabs, herring and ground nuts, then traded a number of furs, including beaver, marten, otter, wild cat, fox, deer and seal (Archer 1843:79-80; Winship 1905:42-43).

These reports suggest that Cape Indians had by this time become familiar with European trade, and particularly with the Europeans' desire for animal skins. If the copper ornaments described by Archer were of European origin, this impression would be reinforced. Copper was, however, the only metal which New England natives acquired through trade with other Indians prior to European contact (Brasser 1978:83), so such an assumption should not be made hastily. Alternatively, Bert

Salwen has suggested that these copper ornaments, and those seen earlier by Verrazzano and later by Pring, may have been "first obtained by Maine and Nova Scotia Indians from European fishermen and fur traders and then traveled southward down a well-established aboriginal coastal trade route" (Salwen 1978:166). Moreover, although Lynn Ceci recently suggested that "some [Indians trading with Gosnold] spoke English with great facility," (Ceci 1982:26) this is not substantiated in Brereton's account. When asserting the intelligence of the natives, Brereton does, indeed, state that the Indians "pronounce our language with a great facilitie" but he follows this immediately with an account of mimicry:

> for one of them one day sitting by me, upon occasion I spake smiling to him these words: "How now (sirha) are you so saucie with my tobacco": which words (without any further repetition) he suddenly spake so plaine and distinctly, as if he had been a long scholar in the language (Winship 1905:46).

Corroborating evidence for a lack of facility with English may be found in the fact that the Natives communicated by signs at Cuttyhunk, although there were fifty Indians present (Winship 1905:42-45).

The distinction between mimicry and fluency is very important here, as a language barrier limits the transmittal of cultural traits. The effects of contact in this case might be restricted to the acquisition of technologically superior but familiar tools, and various ornaments. Despite their inability to communicate with the English in their own language, the Indians clearly communicated a desire for trade, and even friendship (Winship 1905:42,46). Nevertheless, the small party of English, plagued by internal dissent, abandoned their "settlement" on June 18th, 1602, after only three weeks (Archer 1843:81).

Gosnold's expedition was followed the next year by that of Martin Pring, who explored the Plymouth Bay area. Pring and his men built a "small baricado", where local Indians visited them, frequently in groups of as many as sixty. These Indians ate the Europeans' peas and beans, but, as it was late spring, had mostly fish themselves. Exploring inland, Pring encountered gardens sown with "Tobacco, Pumpions, Cowcumbers, and such like; and [noted that] some of the people had Maiz or Indian Wheate among them." Pring, like Gosnold, took note of the available natural resources (Howe 1969:68-73).

The most detailed pre-1620 descriptions of Cape Cod are those detailing the exploratory voyages of de Poutrincourt in 1605 and 1606. These voyages represented attempts by the French in Canada to discover a more suitable settlement site. The 1605 voyage was chronicled by Samuel de Champlain. Firsthand accounts of the 1606 voyage from Port Royal were written by both Champlain and Marc Lescarbot. Lescarbot also wrote an account of the 1605 voyage, but since he was not a participant, that report is not considered here.

In 1605, Champlain said of the Provincetown area: "There is a great extent of open country along the shore before one enters the woods, which are very delightful and pleasant to the eye..." His company then proceeded south to Nauset, where "they perceived a bay with wigwams bordering it all around" (Champlain 1922:348-349).

On July 21, a small party went ashore at Nauset Bay, where:

> before reaching [the Indians′]...wigwams [they] entered a field planted with Indian corn...[which] was in flower, and some five and a half feet in height. There is some less advanced, which they sow later. We saw...Brazilian beans, many edible squashes... tobacco, and roots which they cultivate...There were also several fields not cultivated for the reason that the Indians let them lie fallow. When they wish to plant them, they set fire to the weeds and then dig up the field with their wooden spades (Champlain 1922:351-352).

Although Pring had noted "maiz" among the Plymouth Bay Indians in 1603, Champlain′s account is the earliest extant account of actual cultivation of maize cultivation in southern New England.

Champlain (1922:352) noted that "[their] wigwams are round, and covered with heavy thatch made of reeds." This description tallies closely with that written by Verrazzano in Rhode Island, eighty years earlier. When Champlain tried to ascertain information on climate from these Indians, they indicated by signs that the snowfall was about twelve inches, and that the harbor never froze (Champlain 1922:352). If Champlain′s interpretation is correct, this suggests that Indians lived at Nauset Bay year-round, or at least that they exploited the resources available there in winter.

Champlain (1922:355) notes that the Indians wore clothes fashioned from grasses and hemp, and both males and females wore loin clothes of animal skin. Men wore their hair shaved on top, with the remainder left long, and sometimes braided, with feathers stuck in it. Their faces were painted red, yellow, and black. Champlain also mentions a "girl with her hair quite neatly done up by means of a skin dyed red, and trimmed on the upper part with little shell beads." (Champlain 1922:326, 355-356). For weapons the men carried spears, clubs, bows and arrows (Champlain 1922:357).

Champlain, like Archer in 1602, described these Cape Indians as "thievish," but added:

> I fancy that, had they anything to barter, they would not resort to thievery. They bartered their bows, arrows, and quivers for pens and buttons and had they possessed anything better, would have done the same with it." (Champlain 1922:357)

The French named the harbor "Mallebarre" (Bad Bar), and left the area on July 25, 1605, after an incident in which a French sailor was killed by the Indians (Champlain 1922:358).

Champlain's descriptions of the material culture and gardens of the Nauset Indians are probably accurate, given his reputation as a keen observer and trustworthy reporter. This assessment is substantiated by the accuracy of his cartography, as noted by Ganong (Champlain 1922:193-201), and the precision of his description of the horseshoe crab (Champlain 1922:358-359). However, it is unlikely that Champlain actually observed planting in July; that description may be derived from his knowledge of those practices among the Indians of the Saco River region (Champlain 1922:327-328). Alternatively it is possible that he was made to understand these procedures by hand signs. The paucity of trade goods offered by the Indians at Nauset stands in sharp contrast to the quantities of furs offered to Gosnold at Cuttyhunk three years earlier. Whether these Indians were unaccustomed to European trade, or merely out of goods by mid-July as Ceci (1982:27) suggests, is uncertain.

De Poutrincourt made another excursion as far south as Cape Cod in the fall of 1606. Marc Lescarbot was present on this voyage, in addition to Champlain. It is unclear whether or not a landing was made at Mallebarre that year. The French reached Nauset Bay on October 2, and were greeted by 150 singing and dancing Indians (Champlain 1922:405-406), but because they had difficulty in entering the harbor, M. de Poutrincourt left the long boat and went in "in a skiff, which 30-40 savages helped to bring inside. [Then] as the tide was high...he came out and withdrew to his long boat [and set sail the next day]" (Lescarbot 1968:329). Lescarbot, at least, either went ashore or passed very close to it, for he described the ripenesss of the grapes in the harbor (Lescarbot 1968:329).

A broken rudder, suffered shortly after leaving Mallebarre, forced the French to land at Stage Harbor, Chatham, where they remained two weeks (Champlain 1922:407-409; Lescarbot 1968:330-331). Champlain described Stage Harbor as an area where

> there is much cleared land and many little hills, whereon the Indians cultivate corn and other grains.... In the sand on ... the hills they dig holes some five to six feet deep more or less, and place their corn and other grains in large grass sacks, which they throw into the said holes, and cover them with sand to a depth of three or four feet above the ground (Champlain 1922:410-411).

Both Champlain and Lescarbot enumerated some of the native plants and animals available at Stage Harbor. Champlain estimated the population at 500-600, and characterized these Indians as "not so much great hunters as fishermen and tillers of the land" (Champlain 1922:412). He also stated that "they adorn themselves with feathers,...beads, and other knick-knacks, which they arrange very neatly after the manner of embroidery" (Champlain 1922:411).

Lescarbot lists the items offered for trade by the Chatham Indians as "tobacco, some chains, necklaces, armlets made of periwinkle shells..., also corn, beans, bows, arrows, quivers, and such small wares" (Lescarbot 1968:338). It appears that the Indians of Chatham in 1606, like their Nauset counterparts the previous year, had no skins to trade. This could be because in October the previous winter's supply had already been traded away, while the new hunting season had not yet begun. Or perhaps Champlain's assessment was correct, the Chatham Indians were "not...great hunters," and the fur trade was not an important part of their economy.

M. de Poutrincourt's stay at Stage Harbor ended tragically. A fatal Indian attack on five isolated Frenchmen was avenged a few days later with the reciprocal slaughter of a number of Indians (Champlain 1922:419-428). This plus the 1605 incident at Nauset established an atmosphere of hostility that prevailed until after the Pilgrims had established their colony at Plymouth. Following these events the French dubbed the spot "Port Fortune" (Misfortune Harbor), and determined to look elsewhere for a settlement site (Champlain 1922:423,427). Indeed, Biggar suggests that such violent incidents probably helped dissuade the French from attempting to settle in southern New England (Champlain 1922:428-429).

Henry Hudson traveled down the coast from Newfoundland and Maine in the summer of 1609. Robert Juet recorded this voyage, Hudson's third. On August third they sighted land and sent the "shallop...to sound in by the shore....They found it deepe five fathoms within bowshot of the shoare; and they went on land and found goodly grapes and rose trees..." (Winship 1905:188). Winship has identified this region as Cape Mallebarre (Winship 1905:188).

The following day, Hudson's men landed near Provincetown, where they found "savages, which seemed very glad of our coming." They gave one Indian "three or foure glass buttons" before setting sail again (Winship 1905:188). The crew also stopped briefly in the Chatham area, where Juet noted that the Indians had "green tobacco and pipes, the boles whereof are made earth and the pipes of red copper" (Howe 1969:173; Winship 1905:189). Hudson's voyage seems to have been a peaceful interlude in the series of violent episodes which had begun to mar contacts between Europeans and Cape Cod Indians. Hudson's stops were brief, and apparently did not include trade.

In 1611, Edward Harlow was sent to find an "Isle" at Cape Cod. However, John Smith records that Harlow found "onely Cape Cod no Ile but the maine....He kidnapped three savages...but [one]...got away...not farre from here [the English]...had three men sorely wounded with Arrowes" (Howe 1969:185). The English took another Indian at the Ile of Nohono, and two more at Martha's Vineyard (Howe 1969:185). These kidnappings could only have exacerbated the already hostile disposition of Cape Indians toward Europeans.

John Smith himself made a more extensive exploration of Massachusetts Bay and Cape Cod in 1614. Describing Massachusetts Bay, Smith noted "...sandy cliffes and cliffes of rocks, both of which we saw...planted with Gardens and corne fields..."(Howe 1969:246). Of that area inhabited by the Massachusetts, Smith says: "For heere are many Iles all planted with corne; groves, mulberries, salvage gardens, and good harbours....The Sea Coast...all along [has] large corne fields" (Howe 1969:256-257).

Smith was apparently the first to attempt to systematically identify the New England Indians' political divisions and their geographical territories. In this description he included "Cape Cod by which is Pawmet and the Isle of Nauset, of the language and alliance of them of Chawum" (Smith 1884:192). He learned from the Nausets that

> the Massachusetts...sometimes have warres with the Bashabes of Penobscot; and are not always friends with them of Chawum...but now they are all friends, and have each other to trade with so farre as they have societie on each others frontiers. For they make no such voyages as from Penobscot to Cape Cod, seldom to Massachewset (Smith 1884:192).

Smith also asserted that in New England, the Indians of the South have so much corn that they "have what they will from them of the North. But the furs Northward are much better, and in much more plentie, than Southward." (Smith 1884:206; Howe 1969:260). Like Champlain, Smith suggests that Cape Cod, as part of southern New England, was not an ideal location for fur-trapping. Smith's description of trade also suggests that any long-distance trade would have been carried out indirectly, through a number of successive transactions, rather than as a single exchange between two individuals from widely separated territories.

Smith described the Cape's topography as "onely a headland of high hills of sand overgrowne with shrubbie pines, hurts, and such trash..."(Smith 1884:205). However, he went on to suggest that the shoals to the south and southwest should provide the "best and greatest fish to be had, winter and summer in all that countrie" (Smith, 1884:205). Before leaving New England, Smith compiled a detailed list of Massachusetts' natural resources.

Smith returned to try to start a settlement the following year, but had to abort the attempt. His Ship's Master, Thomas Hunt, kidnapped twenty-seven Indians at Monhegan that year, whom he sold into slavery in Spain. Among these were seven "Nossets", (Smith 1884:217-219; Howe 1969:274-275, though he includes the kidnappings in the 1614 voyage). It is noteworthy that there were Nausets in Maine, despite Smith's own assertion that no native trading expeditions "from Penobscot to Cape Cod" occurred.

Although Smith's credibility has sometimes been called into question and the authenticity of some of his more dramatic escapades doubted (see discussion in Lankford, 1967:vii-ix), there appears to be no controversy over the basic facts of Smith's New England voyages. Smith was a fervent champion of colonization of the area, and doubtless presented New England in the best possible light. However, there seems no reason to suspect the veracity of the observations recorded above; one must simply bear in mind that negative impressions or unpleasant incidents may have been omitted. Smith's contributions to our knowledge of Indian culture and his extensive description of natural resources remain among the most important historical records extant for New England.

In 1619, Thomas Dermer sailed the coast from Maine to Cape Cod, en route redeeming two Frenchmen who had survived a shipwreck off Cape Cod in 1616. On his arrival at Manamock (Chatham); Dermer states that he was "unawares taken prisoner..." He was able eventually to turn the tables, briefly taking three Indians and their sachem prisoner. He finally escaped with his life and a canoeful of corn, which was delivered as ransom for the sachem. Soon after, as Dermer's crew attempted to sail from Martha's Vineyard, a "multitude of Indians let flye at [them] from the banke..." (Winship 1905:252-256).

Thus ended yet another unpleasant Indian-European incident, which contributed to the general feeling of suspicion and mistrust which was manifested again when the Pilgrims explored the Cape the following year. This feeling was probably augmented by the tales of Epanow, an Indian kidnapped by Harlow in 1611, who had made his way back to his native Capaock Island.

When the Pilgrims landed at Provincetown in November 1620, they found "sand hills, much like the downs in Holland...; the crust of the earth, a spits depth, excellent black earth, all wooded with oaks, pines, sassafras, juniper, birch, holly, vines, some ash, walnut; the wood for the most part open and without underwood" (Heath 1963:18-19). This description confirms Champlain's description of the area, but differs markedly from that of Smith, who surveyed roughly the same scene just six years earlier. Whether the differences reflect views of distinct environmental areas, or observation of one location from different perspectives, the example should serve to caution ethnohistorians against making broad general statements based on a single historical observation, as well as against making inferences about one area based on reports from another, nearby site.

A group of Pilgrims explored southward overland to Truro from Provincetown. There they found evidence of old cornfields and "new stuble where corne had been set the same year." Other significant finds in Truro included graves, a house with a supply of stored corn and a kettle, both of which the Pilgrims appropriated, and a snare for deer, with acorns strewn below as bait (Bradford 1912:164-165; Heath 1963:21-24). A second exploration comprised a march of six or seven miles along the shore of Cape Cod Bay from East Harbor (now Pilgrim Lake) south to the mouth of the Pamet River. During this expedition, also in the North Truro area, the Pilgrims discovered two wigwams containing, among other things, beans and corn, to which the Europeans again helped themselves (Bradford 1912:166). In Mourt´s Relation, the furnishings of these wigwams are described as follows,

> wooden bowls, trays, dishes, earthern pots, hand-baskets made of crab shells... also an English pail or bucket...also baskets of sundry sorts...[and] two or three deers heads...There was also a company of deers´ feet stuck up in the houses, harts´ horns and eagles claws and sundry...things..., also two or three baskets full of parched acorns, pieces of fish, and a piece of a broiled herring. We found also a little silk grass, and a little tobacco seed, with some other seeds...; without was sundry bundles of flags, and sedge, bulrushes and other stuff to make mats. There was thrust in a hollow tree two or three pieces of venison. ...[The Pilgrims carried away some of the best things.] (Heath 1963:28-29).

This is the earliest full description of the interior of a wigwam. The only evidence of European trade goods is the sole "English bucket" listed among the furnishings. If extensive trade with Europeans was being conducted on Cape Cod, its effects had yet to manifest themselves in the material goods of this Truro wigwam.

Among the other discoveries made that day was the burial site of a blond-haired European, apparently a sailor. The skeleton, accompanied by "a knife, a packneedle, and two or three old iron things," was found in a canvas cassock, covered with a mat. On top of this was placed a carved board, covered by another mat. There was a bow and an assortment of household goods on this mat, which were covered by a third mat, with boards placed over all. A second bundle in the lowest level contained the skeleton of a child, which was also accompanied by grave goods, including a bow and strings of white beads (Heath 1963:27-28). This burial was very similar to native burials the Pilgrims had discovered at nearby Corn Hill on their first exploration (Heath 1963:21); only the blond hair, canvas sack and iron articles suggesting that the corpse was a European. One is tempted to recall the French sailors shipwrecked off Cape Cod in 1616 (Winship 1969:252), but the nature of the burial and presence of the child´s skeleton suggests that the man may have lived among the Indians for a number of years. In any case, although there is clear evidence of contact here, the nature of the burial suggests that the European involved was as much a recipient as an initiator of culture change.

The Pilgrims made a final exploration in Wellfleet Harbor and Eastham, beginning December 16. On the beach, they observed a small group of Indians, busily cutting up "a black thing", which proved to be a blackfish (pilot whale) (Heath 1963:32). Next day, following a path into the woods, they passed a field "where corn had been set, but not that year." Farther on, they found what they took to be a graveyard. The area is described as:

> a great burying place, one part whereof was encompassed with a large palisade, ...with young spires four or five yards long set as close by one another as they could, two or three feet in the ground. Within it was full of graves, some bigger and some less; some were also paled about, and others had like an Indian house made over them, but not matted. Those graves were more sumptuous then those at Cornhill...without the palisade were graves also, but not so costly. From this place we went and found more corn-ground but not of this year (Heath 1963:34).

It is clear that the Eastham area was still inhabited, for the Pilgrims came across some dwellings which had been "lately dwelt in" later that day (Heath 1963:34).

The Pilgrims camped on the shore of Cape Cod Bay in Eastham that night, and were awakened about midnight by strange cries. Next morning they had their first encounter with the Nausets. The Indians attacked at dawn, and after a brief exchange with the English retired into the woods. After the skirmish the Pilgrims picked up eighteen arrows, "some whereof were headed with brass, others with harts´ horn, and others with eagle´s claws" (Heath 1963:37). This description of the arrows is of interest, both because the use of brass indicates trade with Europeans, and because there is no mention of arrows tipped with stone points.

None of the Pilgrims or Natives were injured in their exchange, but the experience convinced the former to look elsewhere for a settlement site, and ended their initial exploration of Cape Cod.

Discussion

With the establishment of the Plymouth colony, Indian-European relations entered a new phase. Contacts were much more frequent, and their effects on Indian culture much more dramatic. Once Europeans began to concentrate their efforts on colonization and conversion of the Indians to Christianity, native exposure to European customs was no longer restricted to the incidental effects of brief trade encounters. The Pilgrims initiated deliberate efforts to regulate Indian life, and to radically alter religious beliefs and social structure. It seems appropriate to end the ethnohistorical summary at this point, and to focus analysis on accounts which preceded the era of continuous contact and sweeping cultural change.

Bearing in mind that the data summarized above are an incomplete record, and that there must have been numerous unrecorded meetings, representing either incidental aspects of fishing voyages or deliberate attempts at establishing trade, some significant inferences may nonetheless be drawn about the nature of Late Woodland way of life, especially subsistence, and the extent of European contact with the Cape Cod Indians.

There were kidnappings of New England natives very early, beginning by at least 1501. By 1509, at least 61 Indians had been abducted on at least four separate occasions. However, there is no indication that any of these Indians were natives of southern New England, or that any of them ever returned to their homelands with stories of other lands and other customs. Thus, although the incidents surely antagonized the local groups, there´s no evidence that there were any more far-reaching effects from these early abductions.

The earliest extant record from southern New England is that of Verrazzano´s exploration of Rhode Island in 1524. Verrazzano reported the cultivation of beans, although corn is not mentioned. Clearly these particular Indians were unaccustomed to trading with Europeans, as Verrazzano had to entice them aboard his vessel with trinkets. These Indians had some articles of wrought copper, almost certainly of native origin.

When Gosnold arrived at Cape Cod almost eighty years later, he encountered a very different situation. He carried on extensive trade with Indians of the mainland Cape and Martha´s Vineyard. These Indians had quantities of skins to offer the English, as well as pipes, tobacco, hemp, and articles of personal adornment. The presence of large quantities of skins and furs, and the friendliness of the Indians in general, suggests a growing familiarity with the Europeans. Still, there is no record of articles of European manufacture among these Indians, unless the copper objects mentioned by Gosnold were not of native origin. Also none of these Indians spoke English. The presence of tobacco among the trade goods offered suggests that some cultivation was practiced, although Gosnold left no descriptions of planted fields. When the Indians feasted Gosnold and his crew, they cooked crabs, fish and ground nuts, a predictable diet for late Spring. These Indians were apparently unsurprised by the appearance of Europeans. However, there is no evidence that there was sufficient previous contact for either a significant acquisition of European goods or major changes in the Indian lifestyle to have occurred.

Champlain made his first visit to Cape Cod three years later, in 1605. At Nauset Harbor in July he saw cultivated fields of corn, beans, squash, tobacco and roots. Since Champlain pointedly observed that the Mallebarre Indians had nothing worthwhile to trade, it seems probable that their choice of habitation location was not dictated by desire for trans-Atlantic trade, as Ceci (1982:27) recently suggested. Similarly, at Chatham the next year, Champlain observed a number of wigwams associated with corn fields, inhabited by Indians who had nothing to trade but corn, beans, bows, arrows, quivers and shell ornaments.

In 1609, when Henry Hudson stoppped briefly in the Nauset area and again at the tip of the Cape, he described the Indians′ tobacco and pipes but made no mention of trade (Winship 1905:188).

Edward Harlow kidnapped four Cape Indians in 1611, the first record of abductions involving natives of Cape Cod. One of those kidnapped was Epanow, who found his way back to Martha′s Vineyard in 1619, probably with detailed accounts of European lifestyle.

John Smith′s 1614 account specifically mentions the relative poverty of the furs in southern New England, and the abundance of corn there. Smith lists beans, gourds and pumpkins among Cape products, and exclaims over the quantities of fish available. Smith apparently conversed with the Nausets, but whether his interpreter was a Nauset resident is unclear. Once again there is no mention of Indian-European trade. It was on one of Smith′s voyages to New England that Hunt kidnapped seven Nausets.

When the Pilgrims arrived at Cape Cod in 1620, it was just one year after Dermer′s unpleasant encounter at Hanamock, where Dermer avenged his own capture by taking several Indians prisoner. The Indians′ attitude had changed dramatically from the friendly receptions initially given to Gosnold in 1602 and Champlain in 1605. A series of violent incidents, beginning with the killing of a sailor at Mallebarre in 1605 and the reciprocal slaughter at Stage Harbor, Chatham, in 1606, and including kidnappings of Nausets in 1611 and 1614/1615 understandably had altered the Indians′ perception of the Europeans. Thus, when the Indians first sighted the Pilgrims at Truro and Wellfleet, they fled. At Eastham they attacked the explorers and effectively drove them from the area. These Nausets, at least, were not eager for trade with the Europeans. Further, the fact that the

Pilgrims noted few objects of European manufacture on Cape Cod-- a kettle, a bucket and brass arrowheads-- suggests that European influence in the area at this date may have been slight, at least as measured by material artifacts. This supposition is supported by T. J. Brasser´s (1978:84) assertion that "...the early traders directed most of their attention to the north because of the relatively larger amount of fur-bearing game...." Brasser (1978:86) further observes that "the long-time restriction of the fur trade to the north is illustrated by the general use of stone hatchets in Massachusetts as late as 1608..." (Brasser 1978:86). Certainly the trade goods observed among the Nausets were serving functions which had previously been served by native goods; there is no indication that their use introduced new subsistence strategies, or otherwise significantly altered the indigenous culture. The variety of foods recorded by the Pilgrims on this exploration, ranging from fish and venison to whale blubber and stored corn, suggest that the Indians continued to practice a mixed subsistence mode combining hunting, gathering and agriculture. The Cape Indians of 1620 lived in wigwams identical to those described by Verrazzano in 1524, and continued to dress in the manner observed by the earliest explorers.

Based on the current archeological record it seems that there was little substantive difference between the material cultures of the Late Woodland and Early Contact periods. While the Indians were not untouched by European contact, the evidence suggests that, prior to colonization, European influence on lower Cape Indians may have been relatively superficial.

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CHAPTER 7

Stratigraphy and Archeological Context of Prehistoric Sites at Cape Cod National Seashore

Christopher L. Borstel

Many agents and processes have contributed to the formation of the prehistoric archeological deposits at Cape Cod National Seashore. The sum of their actions profoundly affects the kinds of questions the survey can answer about the Seashore's prehistory. Study of the archeological sediments reveals some of the processes forming the sites and helps to show the potential strengths and weaknesses of the archeological data. Site sediments also have the potential for directly contributing information about the activities of the prehistoric people of Cape Cod.

The archeological sediments compose a few widely occurring types of stratigraphic units. These strata occur at many sites because the same major site formation processes operated at many localities on the Outer Cape. Most stratigraphic units on the Seashore's archeological sites can be identified as one of seven widely distributed units: uncultivated A horizon, B horizon, intact shell midden, aeolian sand, plowzone, slopewash or artificial fill.

The seven major types of stratigraphic units occur in various relationships with one another, some of which are genetic and some of which are not. Additional strata are found at some sites, but overall these are of minor importance. In addition, features-- former facilities whose presence is marked by deposits of distinct archeological sediments of limited spatial extent-- occur in some of the units. Because this chapter emphasizes the major sedimentalized patterns of the Outer Cape's prehistoric sites, it does not cover these minor entities.

This overview of the seven major stratigraphic units describes their general characteristics based upon field observations. It also identifies processes that may have contributed to the formation of these deposits. The chapter evaluates the contextual integrity of the stratigraphic units and the potential of the units for providing chronological information. Finally, this overview briefly describes the distributions of these units at some of the prehistoric sites in the Seashore and identifies some site-specific interpretive problems.

The chapter initiates a geoarcheological study of the Seashore's sites. It seeks to summarize characteristics and processes and to identify interpretive probelems. Since it is based on field observations not backed by laboratory analysis, the interpretations of this chapter are preliminary. The chapter carries an additional caveat. The survey staff as a group does not agree on the interpretation of all profile, soil characteristics and processes. In preparing this chapter I have considered these differences of opinion, but the conclusions I have drawn remain my own.

Geological Background

Cape Cod is a complex of late Wisconsin glacial landforms that sea level rise and marine erosion have modified (see also Chapter 4 and O'Donnell and Leatherman [1980]). The Cape rests on Cenozoic coastal plain sediments underlain by Precambrian and Paleozoic crystalline basement rocks (Zeigler et al. 1964:706-708, 1965:R302; Oldale 1969). The Outer Cape was formed chiefly of a series of glacial outwash plains laid down about 14,000 to 15,000 years ago (Oldale et al. 1971; Oldale 1976). With sea level rise and coastal erosion, marine landforms have developed in the littoral zone of the Outer Cape. These include marshes, beaches, spits, and the spectacular Provincelands Hook (Zeigler et al. 1965; Fisher 1979).

The outwash plains (extending south from High Head) are predominantly sand with some gravel, cobbles and boulders intermixed. The glacial drift is derived from the underlying basement rocks and coastal plain deposits (Oldale 1976:16). The drift serves in turn as the source for the marine deposits. Glacial drift is also the immediate source of nearly all mineral sediments found in the Outer Cape's archeological sites.

Since deglaciation, podzolic soils have developed in terrestrial areas of the outwash plains. The soils tend to be acidic, sandy and well drained, with moderate potential for erosion and little tendency to frost heave or windthrow. Carver Series soils are most common (Soil Conservation Service 1980, 1982).

Two major geomorphic zones have dominated the Outer Cape during the Holocene. The shore zone includes those areas below high tide and the immediately adjacent areas influenced by the ocean. The upland zone includes the land beyond the reach of the waves and the unstable dunes. The shoreline is a zone of rapid change; in contrast, the upland is a zone of few changes. Through the Holocene, with sea level rise (Redfield and Rubin 1962; Oldale and O'Hara 1980) and coastal erosion (Leatherman et al. 1981), the shore zone has encroached upon the upland. The geomorphic processes of each zone strongly influence the preservation, stratification and visibility of archeological sites. Sites in the shore zone face burial, erosion, or inundation. Sites in the upland zone tend to have compressed stratigraphic columns because virtually no sediment has been deposited in the zone since deglaciation.

Sources of Data

Field observations of test unit profiles serve as the source for the descriptions of stratigraphic units. Excavators recorded soil characteristics in wall profile drawings and schematic sketches for every test unit. Excavation unit profile drawings received greater care than shovel test pit sketches. These records include notes on soil colors and color variations, soil texture, abundance of fire-cracked rock and shell and, in some cases, soil horizon boundary characteristics. Beginning in 1980, supervisors encouraged excavators to classify soil horizons explicitly (e.g., plowzone, A2 horizon, B horizon) whenever the excavation teams had skills sufficient to do so. Excavators used Munsell soil color charts to describe soil colors in many excavation units. Soil texture characteristics, including grain size range and sorting, were determined in the field by feel and appearance. The field notebooks of supervisors supplement the soil descriptions that the test unit records provide.

Distributions of artifacts in excavation units, especially patterns of vertical distributions in profiles, contribute significantly to my analysis of the contextual implications and chronostratigraphic potential of the strata. The basic unit of artifact provenience for the survey is the level within an excavation unit. Excavators dug in either arbitrary or natural levels. Arbitrary levels followed the ground surface slope or the general upper boundary contours of a major unconformity such as the top of a buried shell midden. Arbitrary levels were generally either 5 cm or 10 cm thick, and these are much more useful for this overview than the units dug in natural levels. Excavators rarely recorded the precise vertical and horizontal provenience of artifacts.

Terminology

As used in this chapter, a stratum is a layer at an archeological site

> ...characterized by certain unifying characters, properties, or attributes that distinguish it from adjacent layers. Adjacent strata may be separated by visible planes of bedding, or by less perceptible boundaries of change in lithology, mineralogy, fossil content, chemical constitution, physical properties, age, or any other property. (International Union of Geological Sciences 1976:12)

The strata differ from one another in texture, color, homogeneity (of texture and color), thickness and boundary characteristics. Artifactual inclusions are important only for the definition of shell midden. Stratigraphic position and topographic setting serve as auxiliary criteria only to confirm the classification of a stratum. Genesis is not a direct criterion in the definition of the strata. Indeed, the strata include both sedimentary units laid down during or after the occupation of a site and soil horizons produced through the weathering or cultural modification of pre-existing sediments. The classification of these units should not obscure the dynamic and intergrading relationships among them. In time, with certain agents or processes at work, many of the archeological deposits may be altered from one type of stratum to another.

Alterations to strata include those caused by the churning of soil and by the removal of soil. These kinds of alterations destroy pre-existing stratification of the stratum to some distance below the original surface or upper boundary of the unit. The limit to which this disturbance extends is an interface of destruction (Harris 1979:32-35, 124). This interface may be a new surface (e.g., an erosional unconformity), the floor and walls of a hole dug into the ground (e.g., a storage pit) or a subsurface plane that marks the limit of penetration of the agent of disturbance (e.g., the base of a plowzone).

The strata contain accumultaions of artifacts and, following Harris (1979), the associations between artifacts and strata can be termed indigenous, infiltrated or residual. Indigenous artifacts "are those newly introduced to a site during the formation of the...[stratum] in which they are found" (Harris 1979:124). Infiltrated finds "are those known to be of a later date than that of the layer in which they were found, having been introduced into the...[stratum], after the end of its deposition, from superimposed layers" (Harris 1979:124). Residual ("reworked") artifacts are of an earlier date than the stratum in which they are found and "were derived from pre-existing strata" (Harris 1979:126). Strata with good context are those with indigenous artifacts. Strata with poor context are those with infiltrated or residual artifacts.

Stratigraphic Units

Uncultivated A Horizon

The uncultivated A horizon is usually mottled and often includes both an A1 horizon and an A2 horizon (a podzolic or AE horizon) (Tables 7.1-7.3). The A1 horizon is generally dominated by dark gray or black, and the A2 horizon is usually light gray or white. The A2 horizon is often, but not always, present. The mottling and presence of the A2 horizon are indications that plowing has not disrupted the stratum. Soil texture, most often silty fine to medium sand with gravel, is inherited from the parent glacial drift. The upper boundary of this stratum may either be the original, pre-burial, surface or an erosional unconformity. The lower boundary is the natural limit which A horizon development has reached; it is typically sharp and wavy.

B Horizon

The B horizon is yellowish-brown, brownish-yellow or strong brown (Tables 7.1-7.3, 7.5). Occasional B2 horizon colors include strong brown (ranging over 7.5YR4/6-5/6-5/8), brownish-yellow (10YR6/6-6/8), and yellow (10YR7/6-7/8). If the excavation profile extends deeply enough, soil color generally grades to a lighter color, usually a 10YR Munsell hue and a high chroma value. Where the upper portion of the B horizon is undisturbed, a reddish brown B21 horizon often occurs above the ubiquitous yellowish-brown horizon. The upper 5-20 cm of this horizon sometimes contains mottles of A horizon or plowzone soil. The texture, like that of the parent glacial drift, is generally moderately sorted silty fine to medium sand with gravel. In some profiles, the particle sorting improves with depth. The upper boundary of this stratum may either be the natural limit of horizon development or it may be an interface of destruction.

Intact Shell Midden

Intact shell middens are typically strata of abundant shell with black, dark gray or dark brown soil. This soil is usually similar in texture to the surrounding non-midden soil, but contains abundant finely divided organic matter. The general term "shell midden" is used here. Readers should note that in Chapter 16 which syntehsizes much of the prehistoric data shell middens and general middens are differentiated.

TABLE 7.1

Summary of Soil Characteristics of Buried Uncultivated Soil:
19 BN 281 Excavation Units

Horizon	Typical Thickness	Description
IIA1	7-14 cm (range:0cm (eroded)-43cm)	Typically dark gray (10YR4/1), gray (10YR5/1-6/1) or grayish brown (10YR4/2-6/2), often having distinct ca. 2-10 cm diameter mottles of light gray (10YR7/1), brown (10YR4/3-5/3), yellowish brown (10YR4/4-5/4) or strong brown (7.5YR5/6-5/8). Organic pad or recognizable decaying plant parts absent. Moderately sorted silty medium to coarse sand; gravel, pebbles, and cobbles (in decreasing order of abundance) present.
IIA2	0-8 cm	Typically light gray (10YR6-7/1-7/2), or light brownish gray (10YR6/2) often with distinct 2-10 cm diameter mottles of dark gray, gray, brown, grayish brown, yellowish brown, or strong brown. Moderately sorted silty medium to coarse sand: gravel, etc., present (as above). Occurs in about one-quarter of the EUs. Horizon may be discontinuous where present and often occurs with IIB21 horizon.
IIB21	0-8 cm	Dark brown (7.5YR3/4-4/4) or dark reddish gray (5YR4/2): Moderately sorted silty medium to coarse sand; gravel, etc., present (as above). Occurs in about one-quarter of the EUs, often in association with IIA2.
IIB2 (Incl. IIB22 Beneath IIB21	40 cm	Strong brown (7.5YR5/8), yellowish brown (10 YR5/8) or dark yellowish brown (10YR4/4-4/6), sometimes grading to brownish yellow (10YR6/6-8) with depth. Moderately sorted silty medium to coarse sand, often grading to silty coarse sand with depth: gravel, pebbles, and cobbles present and often increase somewhat in abundance with depth. Beginning 15-40 cm below the top of this horizon a diffuse zone of late-glacial ventifacts is frequently present.

Notes: This summary is based on 74 excavation unit profiles. Records do not comment on boundary characteristics. The paleosol is buried beneath 0-115 cm (average ca. 30 cm) of aeolian sand; this sand layer probably dates to the seventeenth or eighteenth centuries.

TABLE 7.2

Soil Characteristics of Buried Uncultivated Soil: 19 BN 355, Excavation Unit 2

Horizon	Typical Thickness	Description
A1	13-18 cm	Upper third of horizon is grayish brown (10YR5/2); lowest two-thirds is dark gray (10YR4/1). Very mottled throughout. Predominantly white (10 YR8/1) to light gray (10YR7/1) thin and long mottles, 1-3 cm thick and discontinuously extending for 50-75 cm. Small black (10YR2/1), yellow (10YR7/6-7/8), or brownish yellow (10YR6/6) mottles also present. Organic matter occurs as fine fibers and flecks, but distinct organic pad absent. Moderately sorted fine to medium sand; coarse sand and gravel rare. Lower boundary distinct, smooth.
A2	15-22 cm	Light gray to white (10YR7/1-8/1). Rare small, indistinct mottles of gray (10YR5/1) or brownish yellow to yellow (10YR6/8-7/8), generally less than 5 cm in diameter. Moderately sorted fine to medium sand; coarse sand and gravel rare. Lower boundary distinct, extremely wavy.
B21	6-14 cm	Dark brown (7.5YR3/4). Mottling absent. Moderately sorted medium sand. Lower boundary is wavy, indistinct-gradational.
B22	ca. 28 cm	Strong brown (10YR5/6). Mottling absent. Moderately sorted medium sand. Lower boundary is gradational.
B3	30 cm	Yellow (10YR7/6). Mottling absent. Moderately sorted medium sand; texture coarsens slightly with depth. Lower boundary not reached.

Note: This soil profile buried beneath about 65 cm of historic period road (?) fill.

TABLE 7.3

Soil Characteristics of Buried Uncultivated (?) Soil:
19 BN 374, Excavation Unit 1

Horizon	Typical Thickness	Description
A1(?)	ca. 35 cm	Very dark grayish brown (10YR3/2). Silt. Darker and siltier than slopewash above. Upper boundary approximates former ground surface. Lower boundary wavy, distinct.
A2	10-16 cm	Upper 0-10 cm is predominantly very dark gray (10YR3/1), while remainder of horizon is predominantly light gray (10YR7/1). Very mottled throughout, including small diffuse mottles of very dark grayish brown (10YR3/2) and dark yellowish brown (10YR4/4), small distinct mottles of black (7.5YR2/0), and large diffuse mottles of gray (10YR5/1). Silt. Lower boundary wavy, distinct.
B2	4-12 cm	Dark reddish brown (5YR3/3) with occasional diffuse mottles of very dark gray (10YR3/1) and very dark grayish brown (10YR3/2) and small distinct mottles of yellow (10YR7/8). These yellow mottles are larger and more distinct toward the bottom of the horizon. Silt. Lower boundary wavy, distinct.
B3(?)	20 cm	Brownish yellow (10YR6/8) grading within 10 cm to light olive brown (2.5Y5/4). Clayey silt. Lower boundary not reached.

Notes: This soil profile is buried beneath 90-100 cm of slopewashed fine sandy silt at the bottom of a small kettle. Silty texture of this profile is atypical for soil textures at 19 BN 374.

Internal stratification varies among intact middens. Some middens appear to be massive, dominated by one species of mollusc shells (usually *Mercenaria mercenaria*). In these deposits the size distribution of shell fragments is uniform throughout, and the proportions of soil and shell are homogeneous. Soil color and texture is also uniform. Other middens are composed of numerous individual deposits. Some of these are small enough to be entirely enclosed in a one-meter excavation unit, and others are larger (lacking contiguous blocks of excavation units, maximum sizes cannot be accurately assessed). Individual lenses differ in species, abundance, and condition of shell, soil color, compactness, texture and other characteristics. These lenses often occur against a background of a relatively homogeneous stratum-- a "midden matrix"-- with characteristics similar to the massive midden deposits. Facilities such as pits and hearths occur within the middens, as do other features like ash lenses and deposits of noncultural origin. Internal stratigraphic units may be bounded by original surfaces or by interfaces of destruction.

The Seashore's excavated middens range in total thickness from 2 cm to over 50 cm. Their areas cover as little as 5 m^2 to as much as 700 m^2. The upper boundary of all intact middens thus far tested has been an interface of destruction. The lower boundary is usually a pre-existing surface.

Aeolian Deposits

Wind-transported sediments are typically well-sorted medium sand to very fine sand. Aeolian deposits take the form of both dunes and sheets; often these deposits have sedimentary structures. Table 7.4 summarizes the characteristics of the sand sheet at 19BN281, which probably dates to some period between A.D. 1650 and 1900. Thickness of these deposits varies greatly. At 19BN281 the deposit ranges from 0 (absent) cm to 115 cm. Foredune deposits may be several meters thick, thinning landward with wedge-shaped cross sections. The upper boundary of this stratum is usually the present ground surface. The lower boundary is an original surface, resting on either an undisturbed or eroded surface.

Plowzone

The AP horizon (plowzone) is homogeneous in texture and color. Textures are typically those of the parent glacial material: silty fine to medium sand with some gravel and cobbles. Table 7.5 summarizes the characteristics of the plowzone at 19BN308. Plowzones are commonly dark to very dark grayish brown (10YR3/2-4/2) or dark brown (10YR3/3-4/3). Occasionally the strata are dark yellowish brown (10YR3/4-4/4), brown (10YR5/3), very dark brown (10YR2/2), very dark gray (10YR3/1) or black (10YR2/1).

TABLE 7.4

Summary of Soil Characteristics of Aeolian Sand:
19 BN 281 Excavation Units

Horizon	Typical Thickness	Description
IO	2-5 cm	Organic pad consisting of plant roots and decaying plant fragments
IA1	2-10 cm	Gray to grayish brown (10YR5-6/1-2) fine sand; abundant roots
IA2	0-4 cm	Rare. Gray to light gray (10YR5/1-7/1) fine sand.
IC	21-40 cm	Light yellowish brown (10YR6/4), yellowish brown (10YR5/4-5/8) or brownish yellow (10YR6/6-6/8); rarely brown or yellow. Well sorted fine sand to very fine sand: sedimentary structures often absent, but parallel and subparallel lamellae and beds (ca. 1-15 cm thick) of medium sand and coarse sand are sometimes visible, especially as soil dries. Pebbles and cobbles absent.

UNCONFORMITY: Sharply defined boundary between Aeolian Sand and Uncultivated Soil (see Table 7.1) Units. Boundary is sometimes wavy with parts of each unit intruding into the base or top (depending on direction of intrusion) of the other. The ca. 5-15 cm of the Aeolian Unit above this unconformity sometimes include mottles light gray to grayish brown in color.

Paleosol: Uncultivated Soil Unit (see Table 7.1)

Notes: This summary is based on 74 excavation unit profiles. Records do not comment on horizon boundary characteristics within aeolian unit. Range of thickness of unit is 0-115 cm.

TABLE 7.5

Summary of Soil Characteristics of Plowzone: 19 BN 308

Horizon	Typical Thickness	Description
AO	≤ 5 cm	Sod; root mat with mineral soil, including decaying plant parts. Lower boundary smooth, indistinct.
AP	29-37 cm (range:16 cm -47 cm)	Plowzone. Dark to very dark gray (10YR3/1-4/2) to dark to very dark grayish brown (10YR3/2-4/1). Moderately sorted silty fine sand to silty medium sand with gravel and pebbles. Texture and sorting vary within site, largely reflecting textural variations in parent material. Horizon is generally homogenous in color and texture, but mottles of B horizon soil frequently occur in the lowest ca. 5-15 cm of this horizon. These mottles tend to increase in size and tend to become better defined toward the lower boundary of the AP horizon. Shell fragments (of prehistoric and possibly historic origin) often present. Abundance and condition of shell varies widely; fragments are most commonly Mercenaria mercenaria. Lower boundary usually sharp and may be straight or wavy; plowscars filled with AP-horizon soil not noted at base of AP-horizon but waviness of boundary is probably due to plowing.
B2	20 cm	Dark yellowish brown (10YR4/4-4/6) to yellowish brown (10YR5/4-5/8); occasionally strong brown (7.5YR5/6). Moderately sorted silty medium sand to silty fine sand with gravel, pebbles, and cobbles. Generally coarser than AP-horizon. May grade to coarser texture and higher Munsell value or chroma as depth increases in horizon. Mottles and root casts of AP horizon may occur in the upper ca. 10-15 cm of this horizon. Lower boundary of B2 horizon not generally reached.

Notes: Descriptions based on EU and STP records. Thickness ranges represent 300 profiles.

Plowzones at Nauset sites are generally 20 cm to 40 cm thick. Areas of plowzone alone grade into areas where slopewash has been incorporated into the AP horizon and the thickest AP horizons on sites tend to occur at the bases of hillslopes. All plowzones 50 cm or more thick are included in the slopewash unit described in the following section. Plowzones (49 cm or less thick) vary from site to site in average thickness (Table 7.6). Low quartile values for plowzone thicknesses at sites indicate typically thin plowzones; high quartile values indicate typically thick plowzones. Variations in plowzone thickness reflect site topography in part and possibly other factors.

The upper boundary of the plowzone is usually the present ground surface (or an original surface when buried). The lower boundary is usually sharp or distinct; it is an interface of destruction.

Slopewash

Slopewash deposits occur in both cultivated and uncultivated soils. Slopewash deposits in uncultivated areas may include mottles of A and B horizon soil, or they may be banded with alternating zones of light sandy material and darker, possibly organically rich, material. Sediments are generally similar to glacial drift, but slopewash may have somewhat more fine material.

Slopewash horizons in plowzones are frequently similar in color to AP horizons without slopewash. Soil appearance does not always offer specific clues to differentiate AP horizons created by deep plowing alone from plowzones that include small amounts of slopewashed sediment. Consequently, 50 cm has been set as the arbitrary minimum thickness for slopewash-augmented plowzones. This figure is based on comparisons of topography, plowzone thicknesses and clearly defined slopewash deposits. Plowzones 50 cm or more thick are included with slopewash to emphasize the additional process, other than plowing, that contributed to their formation. Slopewash sediments in plowzones may be uniform in color, or thick bands of slightly differing soil colors may occur. The boundaries between these bands usually are poorly defined. Slopewashed sediments in the bottoms of kettle holes often have plowzones that are darker and grayer than nonslopewash plowzones. This probably results from a greater abundance of organic matter, possibly because the soil in the bottoms of these kettles was moister, allowing thicker plant growth. Patterns of soil texture in plowed slopewash are similar to those in unplowed slopewash, based on field observations.

Slopewash deposits range from 50 cm (the arbitrary minimum) to over 130 cm thick. Their upper boundaries are usually the present ground surface. The lower boundary in uncultivated

TABLE 7.6
Plowzone (AP-Horizon) Thicknesses at Nauset Sites

Site (19BN---)	n[a]	PZ Thickness (cm)			PZ >50 cm[a,b]	PZ <49 cm[a]	Percentiles (in cm) for Units w/PZ <49 cm				
		Min	Max	Mode			10th	25th	50th	75th	90th
308	341	16	93	28	37	305	26	29	33	37	44
323	58	19	66	35	4	54	21	26	32	35	40
274/339	76	10	46	25	0	76	21	24	27	31	36
340	34	15	85	27,30[c]	1	33	19	21	27	30	38
273/275	51	10	66	28	2	49	20	23	27	30	40
341	86	17	55	28	3	83	22	25	28	36	42
288	278	11	116	23,26[c]	29	249	20	23	26	30	37
390	168	14	100	30	19	149	23	28	32	40	43
333/6/7	51	14	39	20,25[c]	0	51	20	21	25	32	35
374[d]	552	7	130	30	70	482	20	25	29	35	40

[a] Shovel test pits and excavation units.

[b] Includes plowzones that have been thickened by slopewash.

[c] Ties.

[d] Shovel test pits only; does not include 93 excavation units.

slopewash stratum usually is a pre-existing surface (i.e., a former ground surface). Among plowed slopewash deposits the lower boundary may be either a pre-existing surface or an interface of destruction. Internal strata are bounded by either original surfaces or interfaces of destruction.

Artificial Fill

Artificial fill is usually mottled, being a mixture of soil from different places or different sections of the soil profile. Well-defined layers occur in some deposits. Soil texture is typical of local glacial drift: moderately sorted medium sand with particles ranging from pebbles to silt.

Some fill deposits are similar in appearance to plowzones or slopewashed sediments. In these ambiguous situations fill can usually be differentiated by its association with an adjacent building or road or by its relief relative to the surrounding topography. A high abundance of historic artifacts is another indicator in ambiguous situations.

The upper boundary of the unit is usually the present ground surface. The lower boundary, which is almost always sharply defined, may be either a pre-existing surface or an interface of destruction. Boundaries of internal units are usually interfaces of destruction.

Horizontal Extent and Typical Stratigraphic Relationships

The horizontal and vertical relationships among the stratigraphic units provide insights into the processes that created the strata. This section summarizes those relationships, mentions some minor strata associated with the major strata and describes the extent of each stratum and its location relative to site topography.

Uncultivated A Horizon

Uncultivated soils occur only as paleosols buried beneath protective blankets of fill, slopewash or aeolian sand. In places lacking such protective blankets, farming during the seventeenth through nineteenth centuries stirred the soil, creating plowzones. Nearly all land on the Outer Cape seems to have been used at one time or another for crop land, and the extent of uncultivated soils in nonarcheological areas is unknown. At most sites this stratigraphic unit is absent or very limited; the stratum is most commonly located at the bases of steep slopes and in kettle holes. In these settings slopewashed sediments have long accumulated, burying underlying deposits. An uncultivated A horizon may be widespread at 19BN281. A broad sand sheet resulting from historic period deforestation covers the site and plow disturbance appears to be minimal, based on shovel test pits and dispersed 50 cm by 50 cm excavation units.

B Horizon

Uncultivated B horizon is the most extensive of all strata; it underlies all other units on every site. Where an uncultivated A horizon is present, the B horizon is complete, and a B21 horizon is frequently present. In most portions of most sites, plowing has truncated the B horizon. Prehistoric features sometimes intrude into the B horizon.

Mottles of A horizon or plowzone soil sometimes occur in the upper 5 cm to 20 cm of the B horizon. Mottles decrease in size, sharpness and abundance away from the upper boundary of the B horizon (see also plowzones, below). Some of these mottles are root casts and others are animal (worm, insect and mammal) burrows. Still others were probably introduced by plowing, but the survey has encountered no indisputable plowscars in the B horizon beneath plowzones.

Intact Shell Midden

Although shell fragments are common at Seashore archeological sites, they are usually in the plowzone. Intact midden areas are rare, and plowing has truncated most intact deposits. Slopewash sediments often are mixed into the plowzones above the intact deposits. Several middens are at the bases of hillslopes and often fill small hollows or swales.

A shell-free midden zone is often below intact shell deposits. This zone is generally 5-15 cm thick. It is often mottled and usually has a wavy lower boundary. In some deposits this zone is probably formed by the translocation of organic matter from the midden above. Movement probably takes place both through eluviation and through bioturbation. In other cases this zone may represent a compressed and modified A horizon buried beneath shell midden. A2 horizons never occur beneath middens on Outer Cape sites.

Aeolian Deposits

Wind has transported sand onto several archeological sites. At some sites the sand is merely spread across the site in a sheet of varying thickness. At others, the wind has piled the sand into dunes. Usually aeolian deposits are quite young, and soil development is minimal. Most commonly the aeolian sediments form the youngest stratum on the site, burying the entire site or a portion of it. Among the sites the survey has exmained in detail, 19BN281 and 19BN410 have the best examples of wind-transported sand. The wind-blown sand layer at 19BN281 is described in Table 7.4. Site 19BN410, a discontinuous shell midden, was deposited on stabilized dune deposits; during the historic period reactivated dunes have covered and uncovered the site at least once. Foredunes cover parts of several sites in the area of Wellfleet Harbor and portions of 19BN374 in Eastham. Small amounts of wind-transported sand may occur at other Nauset sites, but if aeolian sediments are present, they have been incorporated, like slopewash, into the plowzone.

Plowzone

Most archeological deposits on the Outer Cape are in plowzones. Plowing destroyed many shell middens; shells, especially fragments of *Mercenaria mercenaria*, are common in the plowzones of many sites. Plowzones also incorporate slopewashed sediments and possibly some wind-transported sand.

Mottling occurs in a 10 cm to 30 cm wide zone on either side of the lower boundary of the AP horizon at many Nauset sites. In the plowzone this band includes mottles of yellowish brown B horizon soil; in the B horizon this zone has dark brown AP horizon mottles. The zone tends to be asymmetrical, being somewhat thicker in the B horizon than in the AP horizon. The mottling is probably the result of mechanical disturbance of the soil by plows, roots and burrowing animals.

Slopewash

Slopewashed sediments cover small portions of a number of sites. Such deposits are usually close to the toes of hillslopes and are often on the floors of kettle holes. Slopewash is often plow disturbed, which tends to homogenize the color and texture of the deposit.

The transition between plowzones and slopewash-augmented plowzones is in some profiles gradual and in other profiles abrupt. The pre-existing topography is probably one factor that affects the nature of the transition. Abrupt transitions might develop if a structure, such as a fence line, or an area permanently covered in vegetation, such as a hedgerow, is present to catch the soil as it washes downslope. Such sediment traps are difficult to detect through archeological evidence once they disappear from the landscape. Slopewash sediments, in addition to being mixed into plowzones, often bury intact shell middens and uncultivated soils.

Artificial Fill

Fill is uncommon on Seashore sites. Usually it is the result of the construction of buildings or roads. A number of small fill deposits along Nauset and Salt Pond Bays between 19BN340 and 19BN333 are left from the Cedar Banks of Nauset Golf Course, developed during the late 1920's. The strata beneath the fill are sometimes complete (usually plowzones) and sometimes truncated (usually B horizon).

Formation Processes

Uncultivated A Horizon

The A horizon is the zone in which organic matter is decomposed and the zone from which various chemical constituents are eluviated. Development proceeds through the weathering of the parent glacial material, and through time both the A horizon and the B horizon extend deeper into the parent material. The presence of mottling and of the A2 horizon are good indications that plowing has not disturbed the soil. To say that the soil is uncultivated is not to say that it is undisturbed. Soil organisms constantly churn through the soil, turning it over (Wood and Johnson 1978). Windthrown trees are a major agent of soil disturbance in some areas (Lutz and Griswold 1939, Mueller and Cline 1959), but the sandy soil of Cape Cod and the growth characteristics of the widespread pitch pine (*Pinus rigida*) (Winkler 1982:56-61) suggest windthrow may be a less significant source of soil disturbance on the Cape than elsewhere.

B Horizon

The B horizon forms by the weathering of the parent glacial material. The B horizon is the zone of illuviation. It is also an active zone, in that soil organisms disturb it as they bring down soil from above. These agents account for much of the mottling seen in some profiles. Mottling in B horizons beneath plowzones is a result of the mechanical disturbance of soils by plowing.

Shell Middens

Shell middens are formed chiefly of the discarded shells of molluscs consumed by prehistoric people. Prehistoric people brought other debris to the midden areas, including artifacts and fire-cracked rock. The extent of fine sediments (sands, silts and clays) transported by people to sites has not been evaluated. Some stratigraphic units and features in the midden are intact; others have been reworked by soil organisms (Stein 1983) and the activities of people. Shell middens include various features that imply they were not just refuse piles but were also the loci of other activities.

The nearly universal plow disturbance of shell deposits around Nauset implies that in most places the shell never accumulated to much depth. The deepest deposits are in small topographic hollows. The Outer Cape does not feature shell mounds, found in many other coastal areas of the world. Rather, the shell deposits of Cape Cod seem best described with the term used by Reynolds (1889) for some Potomac River shell midden sites: shell fields. Thin deposits suggest two possibilities, which are not necessarily mutually exclusive: 1) perhaps people did not begin to deposit large amounts of shell until nearly the end of the prehistoric period, so the total amount of shell deposited is rather small; 2) prehistoric disposal of shells may have occurred adjacent to places where other activities took place and these activities may have been constantly shifting in location, thus spreading the refuse thinly over a broad area.

Aeolian Sand

Wind has been a major geomorphic agent on Cape Cod since deglaciation. The drift in many places contains wind-shaped Pleistocene ventifacts (these are common in the B horizon at 19BN281). Wind easily picks up sand on the beaches and from the faces of the marine cliffs and builds it into dunes. When forests on Cape Cod reached their nadir in the nineteenth century, writers like Thoreau (1961) described a barren landscape dominated by wind. During that time the wind eroded not only the beaches and cliffs, but also in places the plains of Eastham, Wellfleet, and Truro. Aeolian sand includes some small artifacts redeposited by the wind.

Plowzone

The plowzone is created by the stirring of the soil as the plow is pulled through it. Plowing on the Cape seems to have reached an average of 30-40 cm into the soil. Ward (1980:64-73) presents a useful summary of plows and their effects. The importance of agriculture on the Outer Cape had largely declined by the beginning of the twentieth century. Local residents say that tractor-pulled plows were rarely used on the Outer Cape (Susan Chase, personal communication, 1983; survey informant records).

Slopewash

Sheetwash and rill erosion were active forces in the uncultivated fields of the early European settlers and their descendants. Despite the high permeability of the Cape's soils, particles and clasts washed downslope with each rainstorm, especially on steep slopes. In upslope areas lag deposits of heavy clasts were probably created; farmers may also have plowed deeper into hilltop B horizons as the overlying sediment washed away. Downslope areas were filled with sediment carried downhill from above. I do not have a precise notion of the distances that artifacts would have been carried by slopewash. Intensive Indian horticulture and settlement might have started slopewash deposits in some places (e.g., around Nauset) before Contact.

Artificial Fill

Fill is used to improve drainage or elevation and for other landscaping purposes. It is generally associated with buildings and roads, and most of these date to the eighteenth through twentieth centuries. A major landscaping project in the Nauset area was the construction of a golf course in the 1920's. Numerous bunkers, sand traps, tees, greens and fairways were built which involved both filling of some spots and the excavation of other places.

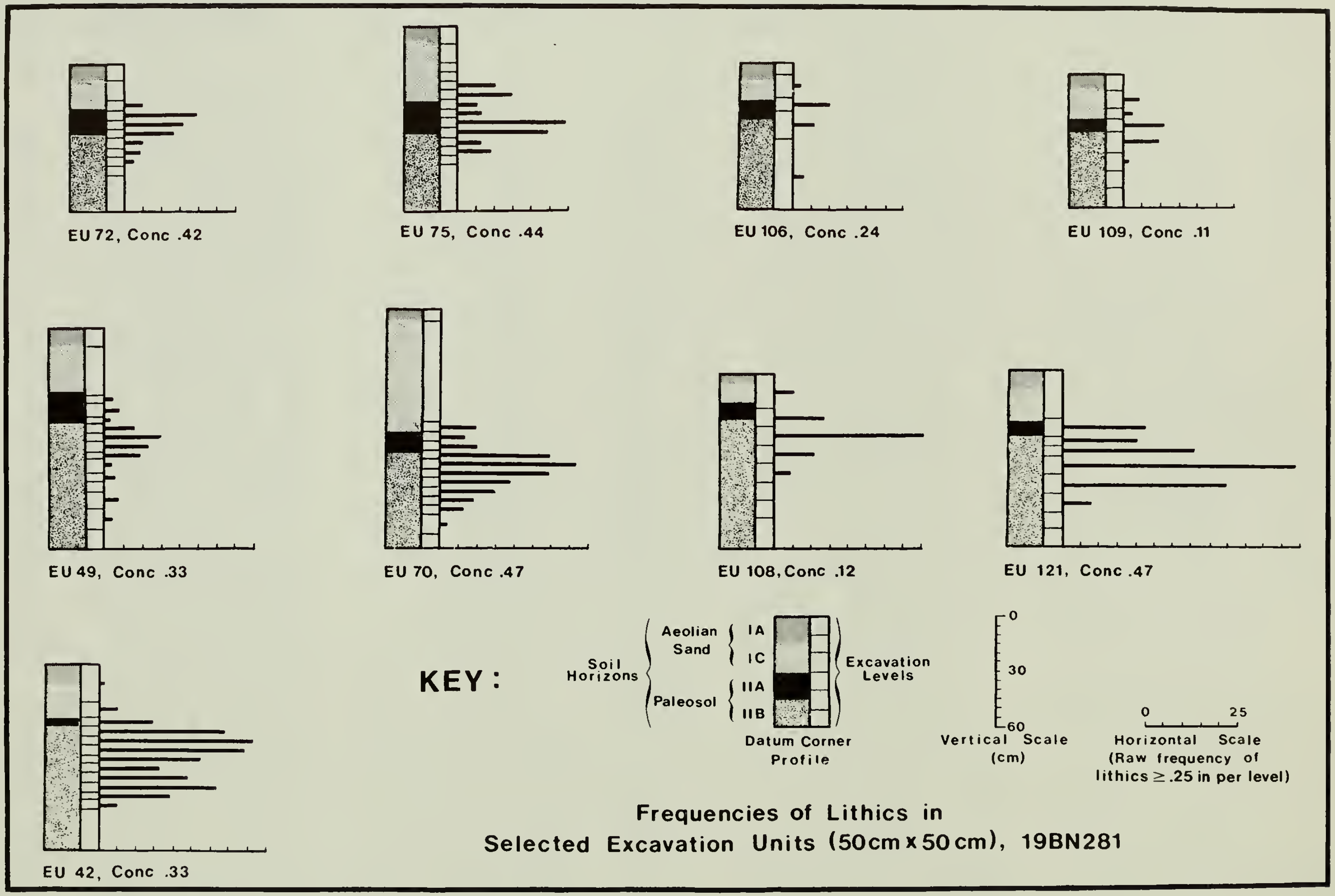
Deposit Context and Chronostratigraphic Potential

Uncultivated Soil

Site 19BN281 is a single component Late Archaic site (see Chapter 8). It is the best example in the survey's sample of a site with artifacts in an uncultivated soil. The distributions of stone tools and debitage at this site provide an indication of how, in nonmidden contexts, artifacts at many Cape Cod sites may have been distributed in the soil column prior to agricultural disturbance of the soil.

The major portion of the archeological assemblage is in a paleosol developed on glacial drift. The paleosol is buried beneath an aeolian sand sheet which probably dates to later than A.D. 1650. Field observations of soil profiles suggest that the paleosol was never seriously disturbed by cultivation, but further work is needed to confirm this hypothesis. Soil profiles also suggest that, except in isolated places where the ground was eroded just before being covered with aeolian sand, the upper boundary of the paleosol is roughly the preburial land surface.

Artifacts span 30 cm or more of profile at the site (Figure 7.1). The vertical distributions are usually unimodal (Table 7.7), but often asymmetric relative to the upper boundary of the paleosol (Figure 7.1). The peak frequency often occurs within 20 cm of this boundary (i.e., within 20 cm of the preburial surface), but peaks are not at a single fixed depth beneath the



Frequencies of Lithics in
Selected Excavation Units (50cm x 50cm), 19BN281

FIGURE 7.1

TABLE 7.7

Number of Peak Lithic Frequencies Per Soil Horizon, 19 BN 281

Horizon	N (EUs)
IA/IC	1
IC: 0-10 cm above I/II boundary	3
IIA	40
~ 0-10 cm of IIA: 30 (2 are ?)	
~ 10-20 cm of IIA: 9 (1 is ?)	
~ 20-30 cm of IIA: 1	
IIA/IIB	8
IIB	37
~ 0-10 cm of IIB: 34 (2 are ?)	
~ 10-20 cm of IIB: 2	
Other: 1	
Bimodal	3

Notes: Includes excavation units with totals of 10 or more lithics ≥ 0.25 in. Patterns in units with fewer lithics are ambiguous. Peaks in vertical distributions of artifacts identified using frequencies of lithics per 10 cm level. Soil profile I is a recent aeolian sand layer; profile II is the buried uncultivated soil.

former land surface. Peak frequencies are about evenly divided between the A horizon (Figure 7.1: upper row) and the upper portion of the B horizon (Figure 7.1: middle row). Occasionally the distributions are bimodal (Figure 7.1: lower left corner).

The mechanisms responsible for the form of the distributions are not entirely clear. Depending upon the precise formation processes at work, and depending upon one's perspective, the artifact assemblage may be either indigenous, infiltrated or residual.

Initially the debitage and lost, abandoned, broken or exhausted implements probably were deposited on the ground surface. Late Archaic people in the kind of forested, open-air setting represented by 19BN281 (and other Cape sites) did not need an elaborate system for lithic refuse disposal. Much of the refuse was probably left where it was dropped (i.e., the deposits are in primary archeological context in Schiffer's [1972] terms). Some debris may have been swept aside or gathered up for secondary deposition, but disposal on the ground near the location of production would have sufficed to clear debris away from heavily used places around the camp. Certainly there is absolutely no indication that at 19BN281 Archaic people dug pits to dispose of lithic debris.

The peaks in the artifact distributions may represent the location of a former land surface. The interface between the aeolian sand and the paleosol roughly represents the location of the ground surface when the paleosol was buried. No significant amount of sediment has been added to upland ground surfaces like the area of 19BN281 since deglaciation. The location of peak artifact frequencies at depths beneath the aeolian sand-paleosol interface implies that the ground surface at the site moved some centimeters upwards between the Late Archaic people's occupancy and the burial of the soil profile some time in the last three centuries. The surface may have become buried as worms and other soil organisms moved sediment from the ground beneath onto the surface (Atkinson 1957; Lyford 1963:17; Stein 1983), and as these organisms incorporated organic matter from forest litter into the soil. Various soil disturbance processes may have moved some artifacts upwards and downwards (Wood and Johnson 1978) from the main concentration of artifacts. Such movements account for the spreads around the peaks of the distributions. If the ground surface has moved upwards since Late Archaic people lived at the site, then the artifacts could be considered indigenous (since their locations are for the most part unchanged) or residual (since the artifact locations were deposited on a land surface that has disappeared).

Alternatively, the artifacts may have moved downwards into the profile. Initially, camp foot traffic worked the artifacts into the soil. Soil organisms through their activities created voids in the soil, later filled by the movement of soil, causing artifacts to move primarily downward also. The weight of the artifacts caused them to settle through the soil, as a particle does in a liquid or gas. Frost heaving and windthrow, though not as significant as in some other parts of New England, would also have encouraged the downward movement of artifacts. Variation in the effects of these processes on individual specimens accounts for much of the spread in the distributions. Thomas and Robinson (1980:19-40) have proposed such processes to explain the vertical distribution of artifacts at the John's Bridge site in Vermont. If this is the primary explanation for the distributions, then the artifacts must be considered to have infiltrated into the A and B horizons from the ground surface.

Whichever set of processes dominated, nonmidden portions of sites on the Outer Cape probably had vertical distributions of artifacts resembling those at 19BN281 before cultivation began. Weak stratification might develop under some circumstances, but the lack of sedimentation would mean that even on undisturbed sites stratigraphic columns would be highly compressed and partially mixed. The data from 19BN281 suggest that in about 4,000 years the main zone of artifacts would still tend to be close to the surface (generally less than 20 cm from the surface). Plowing could have easily and thoroughly mixed zones of artifacts from the Late Archaic period or perhaps even earlier.

Shell Middens

Artifact distributions in undisturbed shell middens from the Outer Cape remain poorly analyzed. Generally the artifacts are indigenous, and there is good potential for stratification. Some artifacts may infiltrate older deposits due to the loose packing of shell, as Sanger (1980:3-4) has described for Fernald Point in Maine. Stein (1983: 281) concluded that in a freshwater midden earthworms had probably moved most objects smaller than 2 mm in diameter. In middens with numerous lenses of shell, the artifact density varies from lens to lens. Preliminary data suggest that artifact densities may be greater in deep stratified midden areas than in the shallow midden and nonmidden areas surrounding them. This conclusion implies a different pattern of artifact dispersal (and probably community patterning) than is seen in coastal Maine. There, midden areas tend to have low abundances of artifacts and high shell densities, while habitation areas, generally located on the landward side of sites, have high artifact densities and smaller accumulations of shell (Sanger 1971).

Aeolian Deposits

The survey has found no occupation areas that were on active dunes when people lived at the sites. All artifacts in aeolian deposits are redeposited. The wind tends to scatter artifacts widely and evenly as sites are eroded (Bagnold

1954:158). The extent of scatter is well illustrated by the surface collection at 19BN410 (Foldout Map M). The wind has scattered artifacts over at least 600 m^2. The vertical artifact distributions at 19BN281 (Figure 7.1) provide an additional observation about redeposited artifacts in aeolian contexts. Most artifacts in the windblown sand occur just above the buried land surface. This suggests that the artifacts were eroded and transported relatively short distances. As the land surface became buried, artifacts were no longer being eroded and incorporated into the deposit.

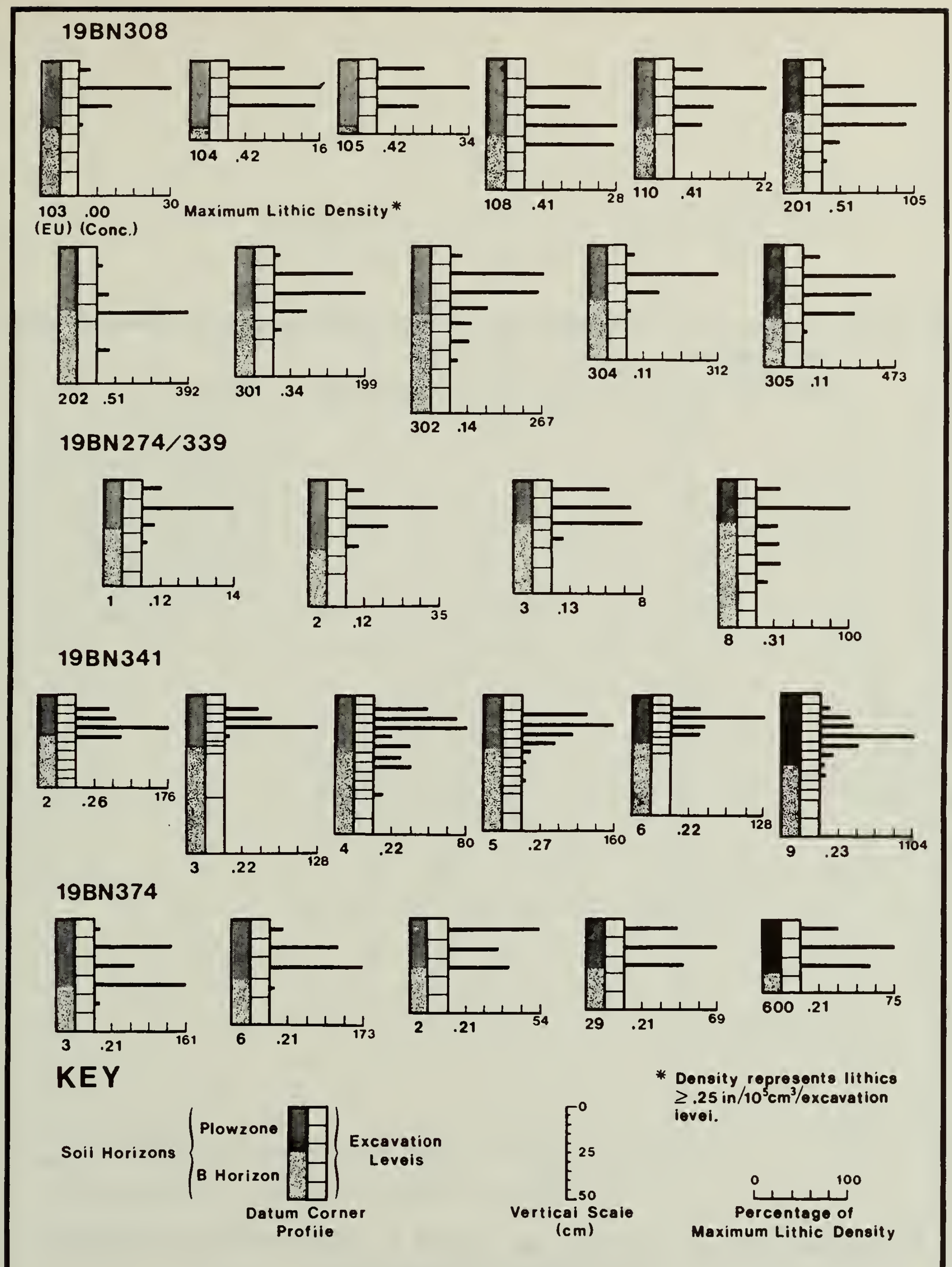
Plowzone

Artifacts in plowzones are residual. The horizontal structure of plow-disturbed sites has been the subject of a number of studies in recent years. The general conclusion is that while plowing destroys small scale patterning, large scale patterning remains. The large scale paterning preserves useful information about site structure. Less well studied are vertical artifact distribution patterns.

Figure 7.2 illustrates the patterns of vertical distribution at four Nauset sites. The stratigraphy of the excavation units illustrated in Figure 7.2 is simple, consisting of a plowzone and a B horizon; no features or subplowzone middens are present in any of the units. Most commonly lithic density distributions are unimodal with a peak density in the 10-20 cm level below the surface. Many of the distributions are asymmetric with more lithics occurring below the level of peak density than above it. Some units deviate from the general pattern either because the peak densities are located higher or lower in the plowzone or because of apparent bimodal distributions. Few lithics occur in the B horizon beneath the plowzone. Plowzones excavated in 5 cm arbitrary levels show the same patterns as those excavated in 10 cm levels, as the excavation units from 19BN341 illustrate.

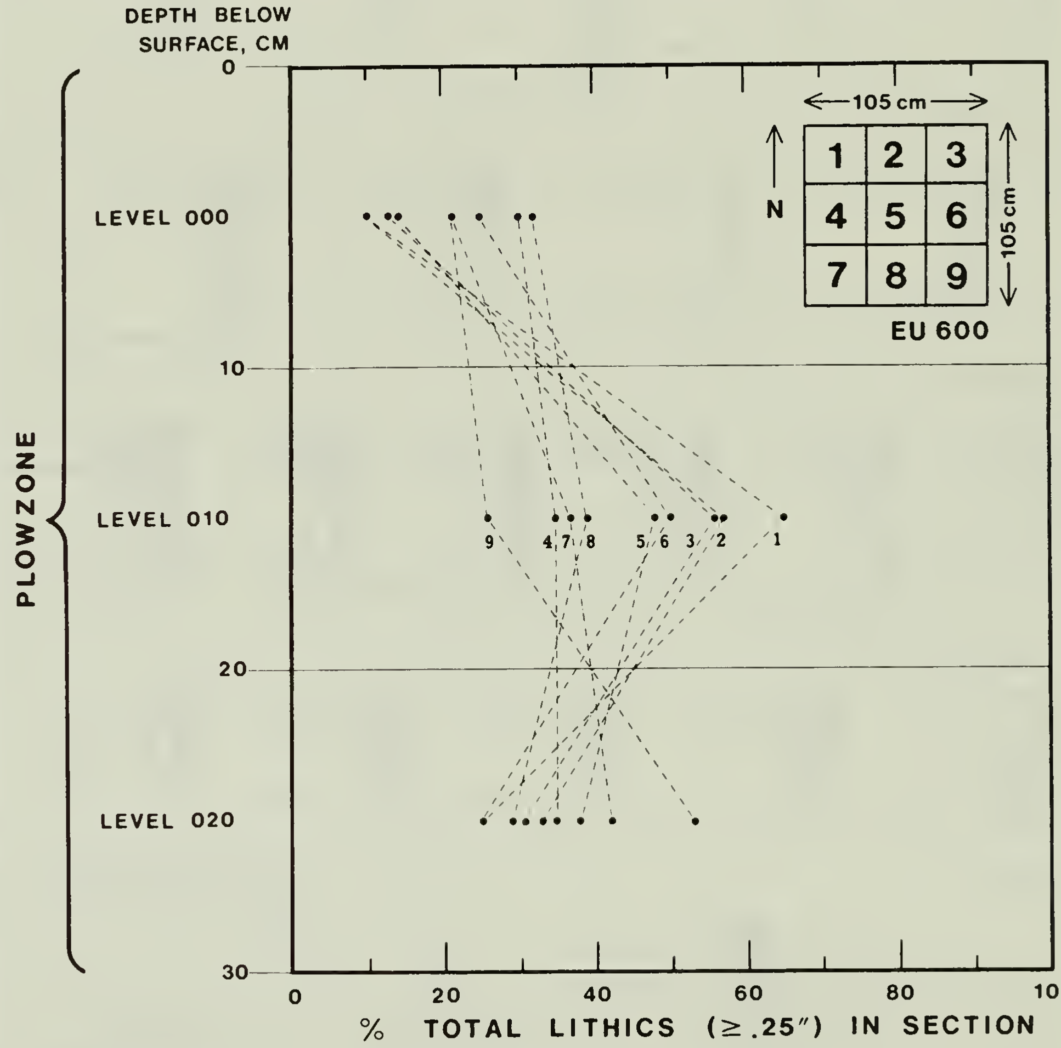
The variation from the general pattern of a peak density in the 10-20 cm level may be random. Figure 7.3 illustrates the patterns of distribution among adjacent 35 cm by 35 cm sections of Excavation Unit 600 at 19BN374. The overall distribution for Excavation Unit 600 is shown in the lower right of Figure 7.2, and Table 7.8 provides data used to construct Figure 7.3. Six sections of Excavation Unit 600 show the general pattern of density distribution shown in Figure 7.2. Three do not (sections 4, 7 and 9). Excavators saw no evidence in the field to suggest a cause for these deviations. Thus, various undetectable randomly occurring processes may be responsible for the deviation from the general pattern. An unnoticed and heavily disturbed feature may be another cause for deviation from the general pattern, though this is not the case for Excavation Unit 600.

Peak artifact abundances occur in the middle of the plowzone for many classes of artifacts. Table 7.9 summarizes the



Lithic Distributions in Plowzones at Four Nauset Sites

FIGURE 7.2



Distribution of Lithics by Level in 35cmx35cm Sections of EU600, 19BN374

FIGURE 7.3

TABLE 7.8

Lithic Frequencies by 10 cm Level Within the Plowzone, Sections of Excavation Unit 600, 19 BN 374

	Excavation Level			
Section	0-10 cm	10-20 cm	20-30 cm	Total
1	2	13	5	20
2	2	12	7	21
3	2	9	5	16
4	6	7	7	20
5	3	10	8	21
6	3	6	3	12
7	5	9	10	24
8	9	11	8	28
9	4	5	10	19
Total	36	82	63	181

Table 7.9

Distributions of Artifacts in Three Excavation Units, 19 BN 308

			Prehistoric			Shell		Historic		
Level	Horizon		Lithic	Ceramic	FCR		Ceramic	Metal	Glass	Brick
Excavation Unit 103 (Conc. 308.00)										
000	AP	N	4	0	1	10	2	0	2	0
		Wt	10.8		13	5.7				
010	AP	N	30	0	4	86	9	7	4	14
		Wt	29.0		157	90.0				
020	AP	N	10	0	0	45	3	3	1	3
		Wt	4.8			32.3				
030	AP/B	N	1	0	0	5	0	0	0	0
		Wt	3.2			6.3				
040	B	N	0	0	0	15	0	0	0	0
		Wt				15.9				
050	B	N	0	0	0	2	0	0	0	0
		Wt				3.8				
060	B	N	0	0	0	2	0	0	0	0
		Wt				8.0				

Table 7.9

(page 2 of 2)

			Prehistoric			Shell	Historic			
Level	Horizon		Lithic	Ceramic	FCR		Ceramic	Metal	Glass	Brick
Excavation Unit 104 (Conc. 308.42)										
000	AP	N	9	0	0	20	7	0	1	4
		Wt	8.4			37.2				
010	AP	N	16	3	3	57	3	3	2	3
		Wt	40.8	6.6	9.8	53.2				
020	AP	N	15	3	0	53	2	0	0	4
		Wt	22.3	9.0		80.1				
030	AP/B	N	0	0	0	10	0	0	0	0
		Wt				4.0				
Excavation Unit 105 (Conc. 308.42)										
000	AP	N	18	3	0	141	2	4	2	14
		Wt	29.6	1.4		110.1				
010	AP	N	34	5	2	226	4	2	1	22
		Wt	69.8	4.1	132	203.3				
020	AP	N	16	4	0	261	2	0	0	4
		Wt	61.3	9.2		208.5				
030	AP/B	N	0	0	0	36	0	0	0	0
		Wt				33				

Notes: Table includes artifacts ≥.25 in. Levels are 10 cm thick (except 104-00-030, which is 15 cm thick). The AP-horizon is the plowzone. Frequencies (N) are counts of pieces, sherds, or fragments; shell frequencies do not include small pieces ≤.25 in broken from larger fragments after excavation. Weights are in g.

distributions for several artifact classes in three excavation units at 19BN308 (lithic distributions are shown in Figure 7.2, upper left). Artifact frequencies and artifact weights for other historic and prehistoric artifact classes generally follow the pattern seen for lithic frequencies, but exceptions occur, particularly among shell and prehistoric ceramics.

The widespread peak in artifact frequencies in the middle of plowzones and the appearance of this pattern among both prehistoric and historic artifacts imply that the mechanical processes of plowing completely shape the vertical structure of artifact distributions in plowzones. If precultivation stratification existed at any site, it is not preserved in the plowzone. In addition, it is unlikely that in nonmidden contexts archeological strata were ever thick enough that undisturbed deposits are preserved beneath plowzones.

Slopewash

Artifacts in slopewash deposits are redeposited. The distance these artifacts may have been transported depends in part on the gradient and length of the slope beside the area which was being filled by slopewash. General estimates of the possible sizes of the areas contributing artifacts to specific slopewashed deposits have not been made. At most sites the processes creating slopewash deposits are closely tied to those creating plowzones. As the slopewashed deposit builds, plowing mixes it. Context is extremely poor for artifacts from these deposits, and any stratification is a product of post-occupation processes.

Artificial Fill

Prehistoric artifacts are redeposited in artificial fill on the Outer Cape. The term artificial is used to denote the action of people in moving the soil. Filling episodes on the Outer Cape ocurred during the 18th, 19th and 20th centuries. The origin of the fill can rarely be known with certainty, but as a general rule, the fill probably comes from nearby. Prehistoric material from fill might be useful at a very gross scale of mapping (e.g., by town), but uncertainties about its provenience make it meaningless for analyses at finer scales.

Overview of Site Stratigraphy

Figures 7.4 through 7.11 map the distribution of stratigraphic units at some of the Seashore's prehistoric sites. The sites included are those that had been investigated before November, 1982 with 50 cm by 50 cm or larger excavation units.

Since the B horizon underlies all other strata in virtually every area of every site and since artifacts are nearly always infiltrated into it, its distribution is not mapped. The accompanying comments also take for granted the ubiquitous presence of the B horizon.

Fort Hill

The most widespread stratum at 19BN308 is the plowzone (Table 7.5), which covers virtually the entire site (Figure 7.4). In some areas of the site, cultivation has incorporated slopewashed sediments into the plowzone. The southern aspect of Fort Hill has the steepest slope, and a major area of slopewash is located along the toe of this section of the hill. Scattered patches of slopewash-thickened plowzone are located in other parts of the site.

The site includes three small areas of undisturbed shell midden. All are south of the parking lot. The plowzone truncates the upper portions of the middens in the eastern and central areas. Excavation Unit 300 (Concentration 308.33) in the eastern midden area reveals a 50 cm thick intact deposit beneath slopewash-augmented plowzone. The deposit is complex. It has several shell lenses of varying sizes, a thin lens of what might be storm-thrown sand and two features. One of these features is a clayey lens; such lenses are common in Cape Cod shell middens (George Stillson, personal communication, 1983), but their depositional histories are poorly understood. In the eastern area, midden development began by at least 3350 + 170 BP (GX-9702) and continued after 910 + 145 (GX-9701). The midden appears to partially fill a southeast-trending swale. Auger Hole 802, located southeast of the excavation unit, suggests that this midden may extend under the salt marsh (see Chapter 8 for comments on radiocarbon dates and a figure showing the stratigraphic column for Auger Hole 802). The intact midden in the central area (Concentration 308.42), like that in the eastern area, is in a small topographic depression. The midden includes a number of shell lenses, but no hearths, pits or postholes. Midden thicknesses range to about 25 cm in the center; the midden's edges feather out. A basal date of 3260 + 135 (GX-9700) from Excavation Unit 107 in the central area is statistically contemporary with the lower date from Excavation Unit 300, indicating that midden deposition was beginning in both areas about 3300 years ago. Nineteenth century fill covers thin (10 cm thick) dense shell deposits in the western midden area (Concentration 308.72); the abrupt contact between the midden and fills suggests that this midden may have been partially removed prior to being covered with fill.

Marshy areas near the three midden areas include archeological materials. In each area the artifacts may be in original context or they may be redeposited by post-occupational events.

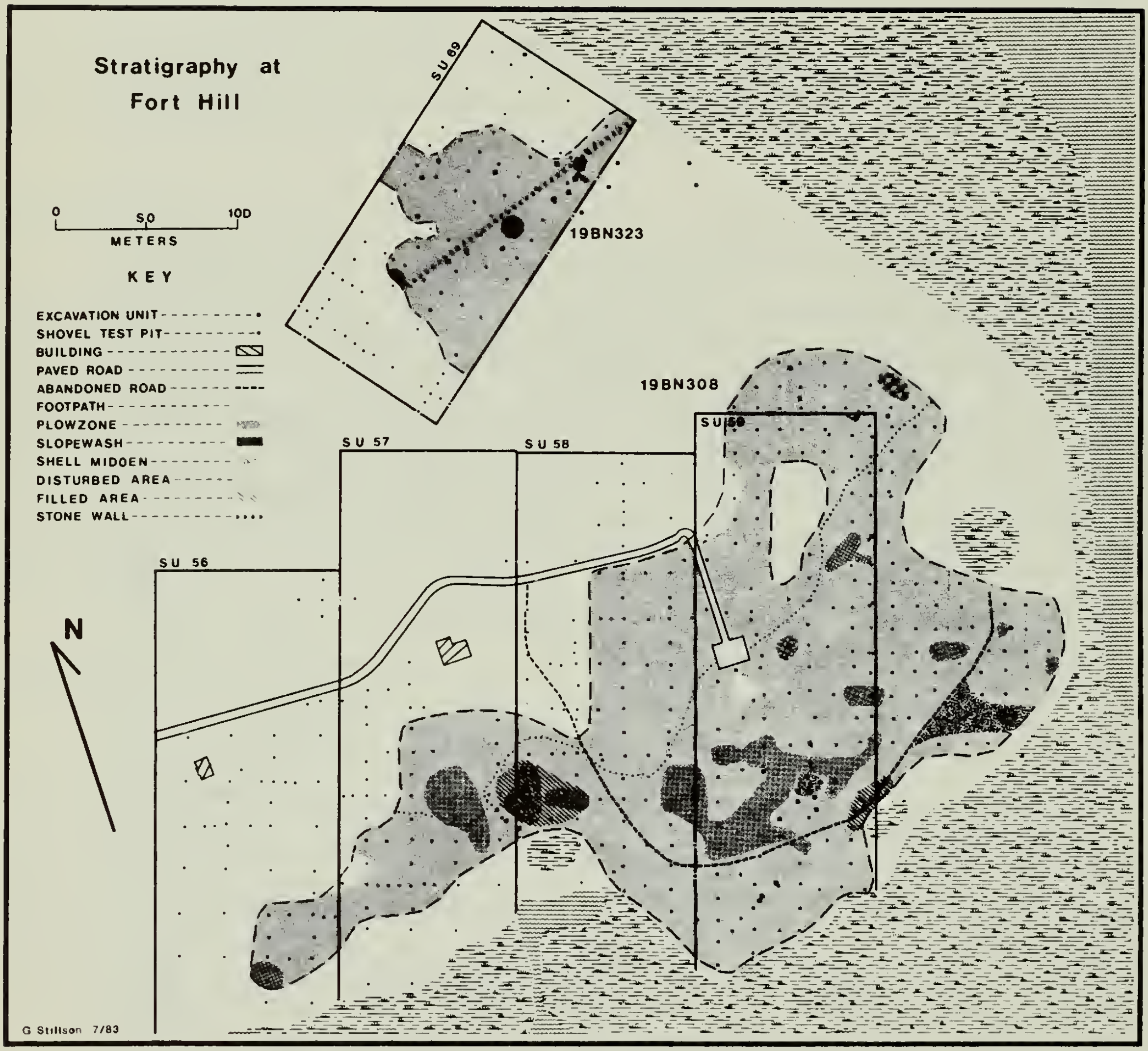

Stratigraphy at Fort Hill
0
50
100
METERS
KEY
EXCAVATION UNIT
SHOVEL TEST PIT
BUILDING
PAVED ROAD
ABANDONED ROAD
FOOTPATH
PLOWZONE
SLOPEWASH
SHELL MIDDEN
DISTURBED AREA
FILLED AREA
STONE WALL
SU 69
19BN323
19BN308
SU 59
SU 58
SU 57
SU 56
N
G Stillson 7/83

FIGURE 7.4

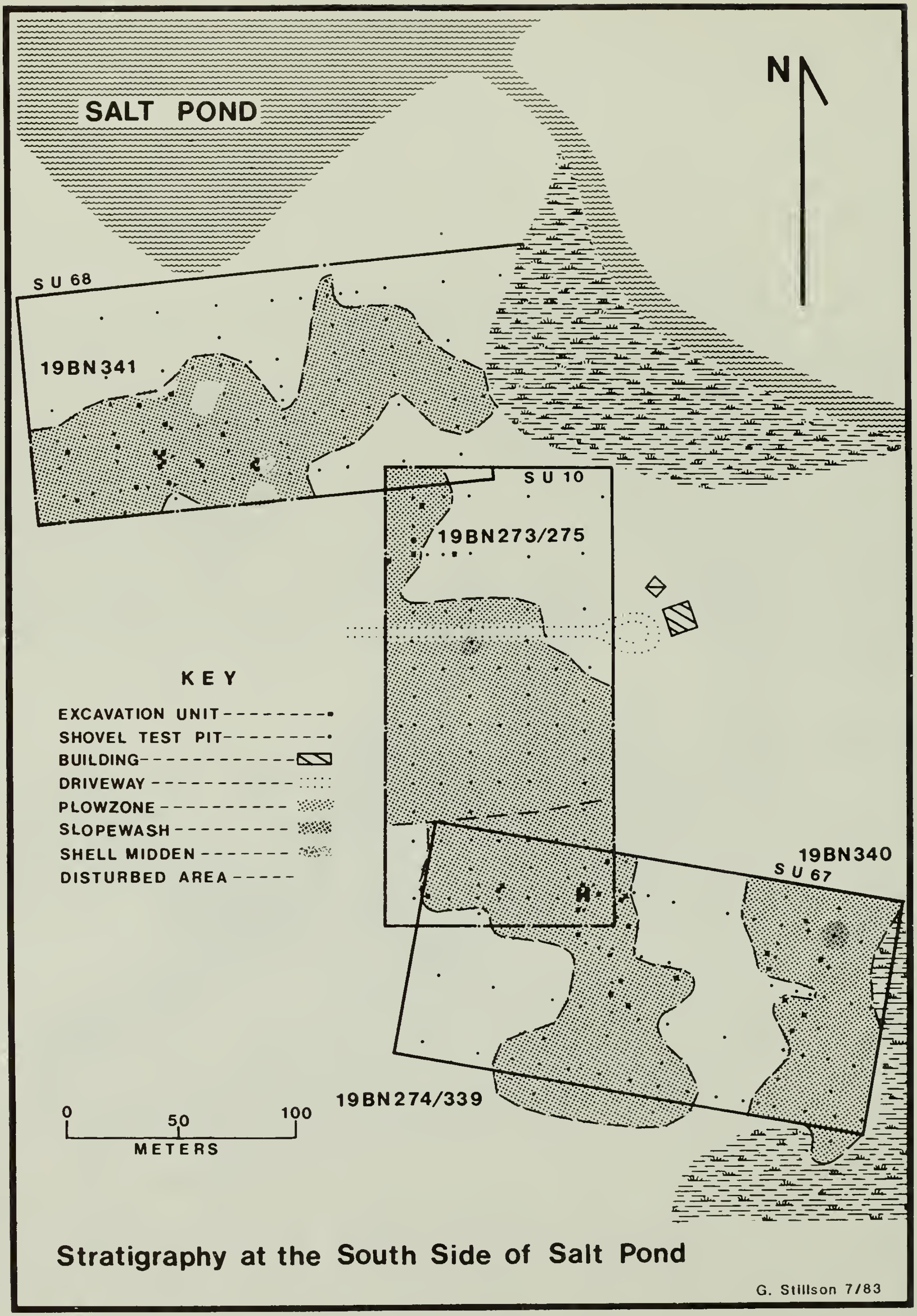
In addition to the fill covering the western midden, historic period deposits and disturbances are also located in other parts of the site. An abandoned road cut encircles all but the northwestern quadrant of Fort Hill along its base. A small embankment of fill allows the old road to cross a marshy depression near the central midden area. Construction of the parking lot on the crest of Fort Hill and the excavation of a pit or foundation immediately south of the parking lot doubtless destroyed archeological deposits atop the hill. Soil stripping in the 1950's denuded an area north of the parking lot access road, and local residents report that the archeological site formerly extended into this area.

At 19BN323 the plowzone is the most widespread stratum (Figure 7.4). A fieldstone wall cuts the site from northwest to southeast. The soil profile in Excavation Unit 8, which abutted the wall, suggests the wall was constructed after the entire field had been cultivated. Therefore, the site apparently has no unplowed sections. The site includes three small areas of thick plowzone, here shown as slopewash deposits because they exceed 50 cm in thickness. These were probably small depressions filled by plow action. Testing did not extend to the south into the kettle hole between the site and Fort Hill, where thick slopewash deposits probably occur. Concentration 323.22 has a small deposit of possibly intact shell; radiocarbon dating suggests that the deposit may be disturbed or redeposited, as discussed in Chapter 8.

Southern Side of Salt Pond

Plowzone is the predominent stratum at the sites around the southern side of Salt Pond: 19BN340, 19BN274/339, 19BN273/275 and 19BN341 (Figure 7.5). Areas of plowzone in excess of 50 cm are rare and isolated. This is a bit surprising considering the relatively steep slopes present in some areas of the sites. Intact shell deposits are limited to an extremely thin 2 cm deposit at 19BN341 (Concentration 341.21).

This cluster of sites marks the southwestern limit of the former Cedar Banks of Nauset Golf Course. Developed by part-time Eastham resident Quincy Adams Shaw, the course covered the lands of several cooperating neighbors. The Cedar Banks links were finished as an eighteen hole course about 1928. A disagreement among neighbors in the mid-1930's restricted the course to nine holes, covering the eastern half of the links. This change apparently required some re-arrangement of the remaining portion of the course, and the course's name was changed to the Nauset Nine golf course. I am uncertain when the golf course closed (the preceding account is based on maps in the survey's files and conversations with local residents). The most obvious remnants of the golf course are several large, irregular pits which are former sand traps. Those that fall within the limits of site investigations have been noted as disturbances.


SALT POND
N
S U 68
19BN341
S U 10
19BN273/275
KEY
EXCAVATION UNIT
SHOVEL TEST PIT
BUILDING
DRIVEWAY
PLOWZONE
SLOPEWASH
SHELL MIDDEN
DISTURBED AREA
19BN340
S U 67
19BN274/339
0
50
100
METERS

Stratigraphy at the South Side of Salt Pond

G. Stillson 7/83

FIGURE 7.5

Northern Side of Salt Pond

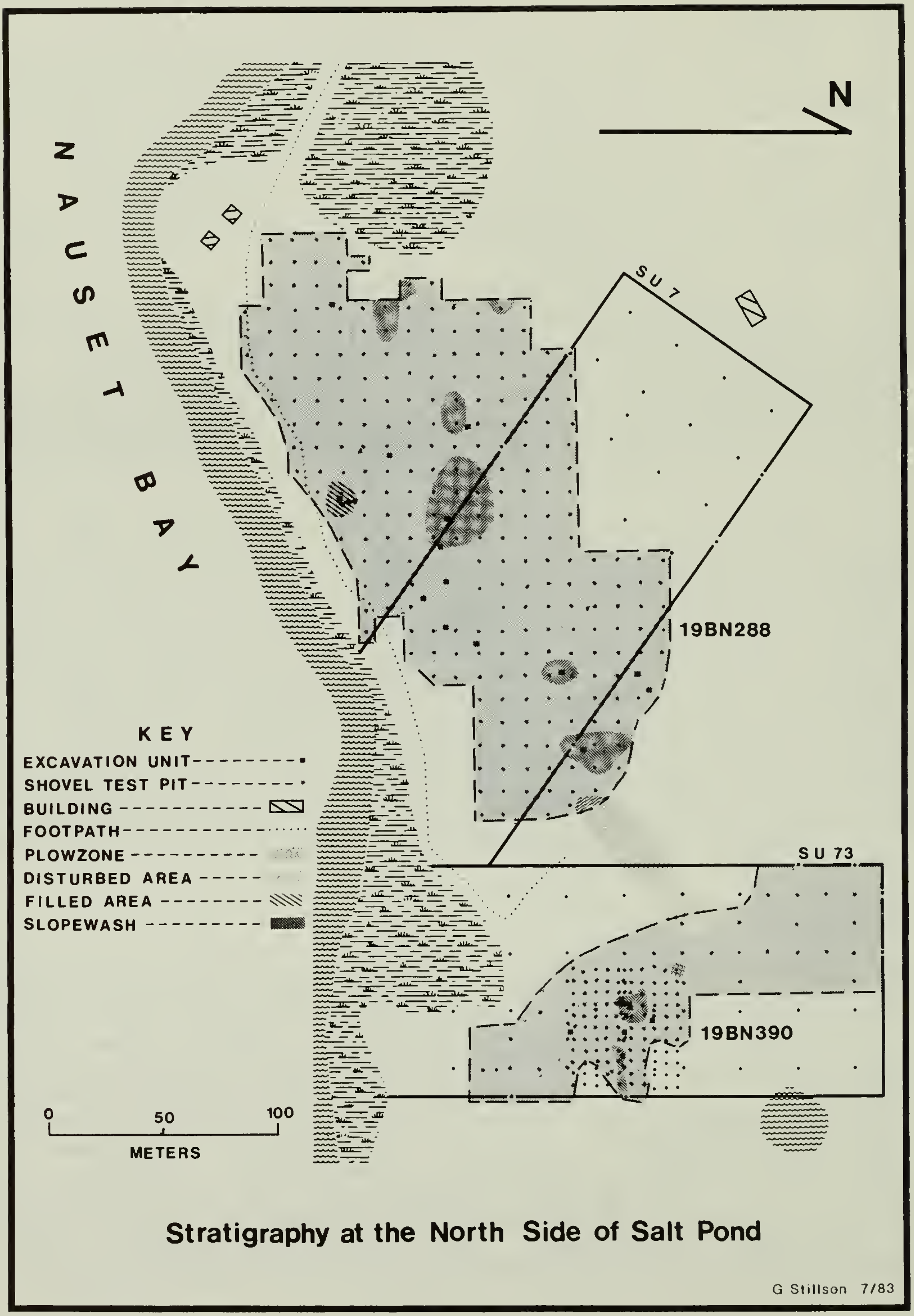
The most common stratum at 19BN288 and 19BN390 is plowzone (Figure 7.6). Plowzones on a ridge in the western part of 19BN288 tend to be thinner than the average for the Nauset area as a whole. This may reflect heavy erosion of the ridge during the historic period. Site 19BN288 is located around and within a kettle hole. Slopewash has covered the floor of the kettle with sediment to depths of more than 100 cm. Other small areas of slopewash and thick plowzone are also found at these sites.

Small intact shell midden deposits appear to be present at both sites. Excavation Unit 1 at 19BN288 (Concentration 288.42) encountered a shell stratum 51 cm thick. The condition of the shell suggests that only the upper 20 cm were broken up by repeated plowing. The lower portion of this shell layer may be an undisturbed prehistoric deposit. Its location near the kettle's floor suggests that it is a secondary deposit produced by prehistoric dumping and slopewash.

The eastern side of 19BN288 marks the western edge of the former Nauset Nine golf course. Excavations encountered several deposits of fill resulting from landscaping for this course and its more extensive predecessor. An extensive sand trap runs between the two site investigation areas. The stratigraphy around the major excavation area at 19BN390 (Concentration 390.33) is problematic. Initial examination of soil profiles suggested that slopewash may account for the thick artifact-bearing deposit in Excavation Units 3, 6, 8 and 9. However, the topography of the area features a short, rather gentle slope which is not the kind of area where such deposits are typically found. A plausible alternative is that the area has a plowzone buried beneath fill from golf course landscaping.

19BN333/6/7

Plowzone is the most widespread stratum at 19BN333/6/7 (Figure 7.7). Areas of deep plowzone are virtually absent at these sites, and within the site investigation areas slopewash does not seem to have been important. These sites mark the approximate eastern edge of the Cedar Banks of Nauset and its successor. Several sand traps pit the landscape. Pot-hunting was once common on the southern side of the road (conversations with local residents), and this, combined with development during the 1950's, heavily damaged archeological deposits there. Development of the northern side of the road was also planned, but not completed, before the establishment of the park in 1961. An abandoned development road running northwest from its intersection with the Tomahawk Trail is still in evidence.


N
NAUSET BAY
SU 7
19BN288
SU 73
19BN390
KEY
EXCAVATION UNIT
SHOVEL TEST PIT
BUILDING
FOOTPATH
PLOWZONE
DISTURBED AREA
FILLED AREA
SLOPEWASH
0
50
100
METERS

Stratigraphy at the North Side of Salt Pond

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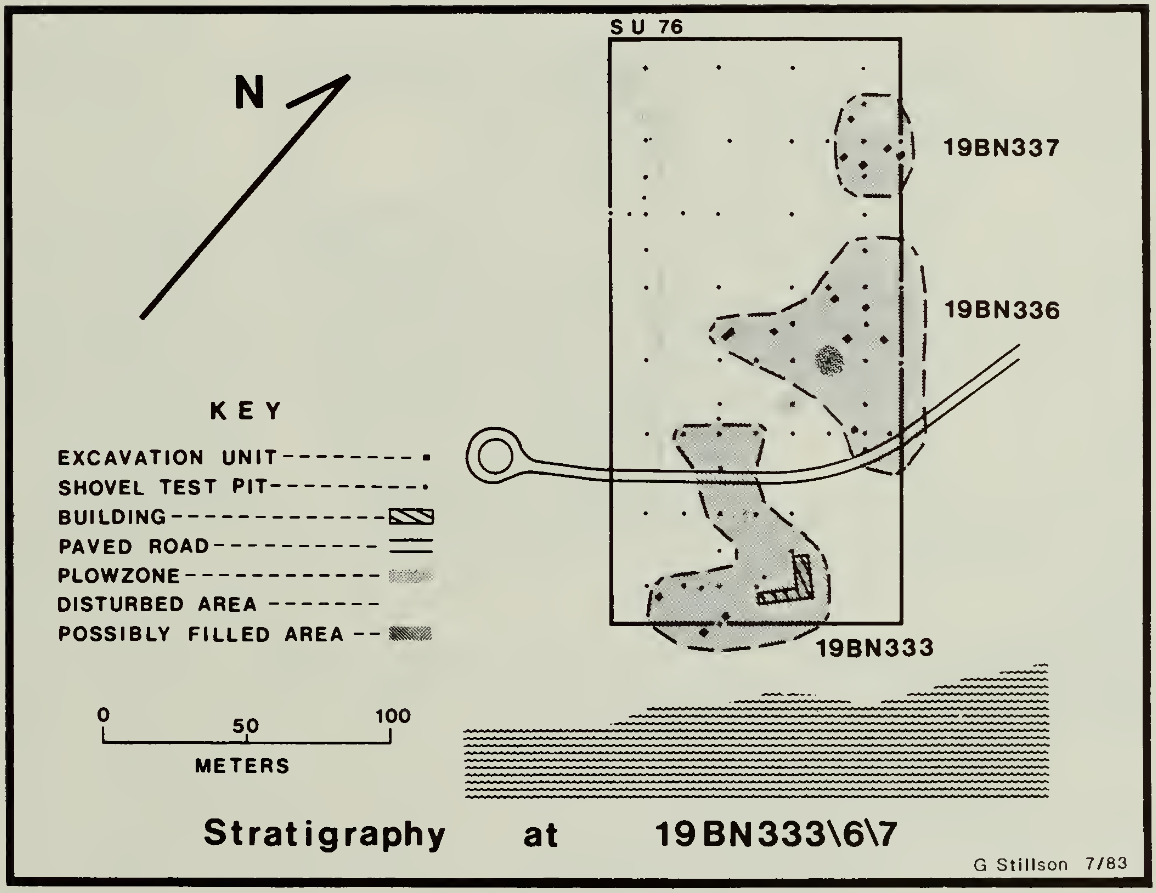
FIGURE 7.6


N
S U 76
19BN337
19BN336
19BN333
KEY
EXCAVATION UNIT
SHOVEL TEST PIT
BUILDING
PAVED ROAD
PLOWZONE
DISTURBED AREA
POSSIBLY FILLED AREA
0
50
100
METERS

Stratigraphy at 19BN333\6\7

G Stillson 7/83

FIGURE 7.7

Coast Guard Beach

The stratigraphy at Coast Guard Beach has been described in a previous report on the site (McManamon and Borstel 1981:16-17). Plowzone is the most widespread stratum at 19BN374 (Figure 7.8). Slopewash has mixed into the plowzone in several areas. The deepest deposit, where slopewash reaches depths of 130 cm, is in a small kettle hole along the bicycle path. Excavation Unit 1 (Concentration 374.51) near the center of this kettle revealed an uncultivated soil to be buried beneath a portion of this slopewash deposit (Table 7.3). Excavations in Concentration 374.43 indicate that the transition from plowzone to slopewash is abrupt to the northeast of the kettle. This sharp boundary may be the result of the former presence of a sediment trap, such as a fenceline or hedgerow. Another large area of slopewash (and possibly fill) is at the northern edge of the site (including the Concentration 374.11 area). This deposit is along the base of the hill adjacent to the old cranberry bog in Nauset Meadow Marsh.

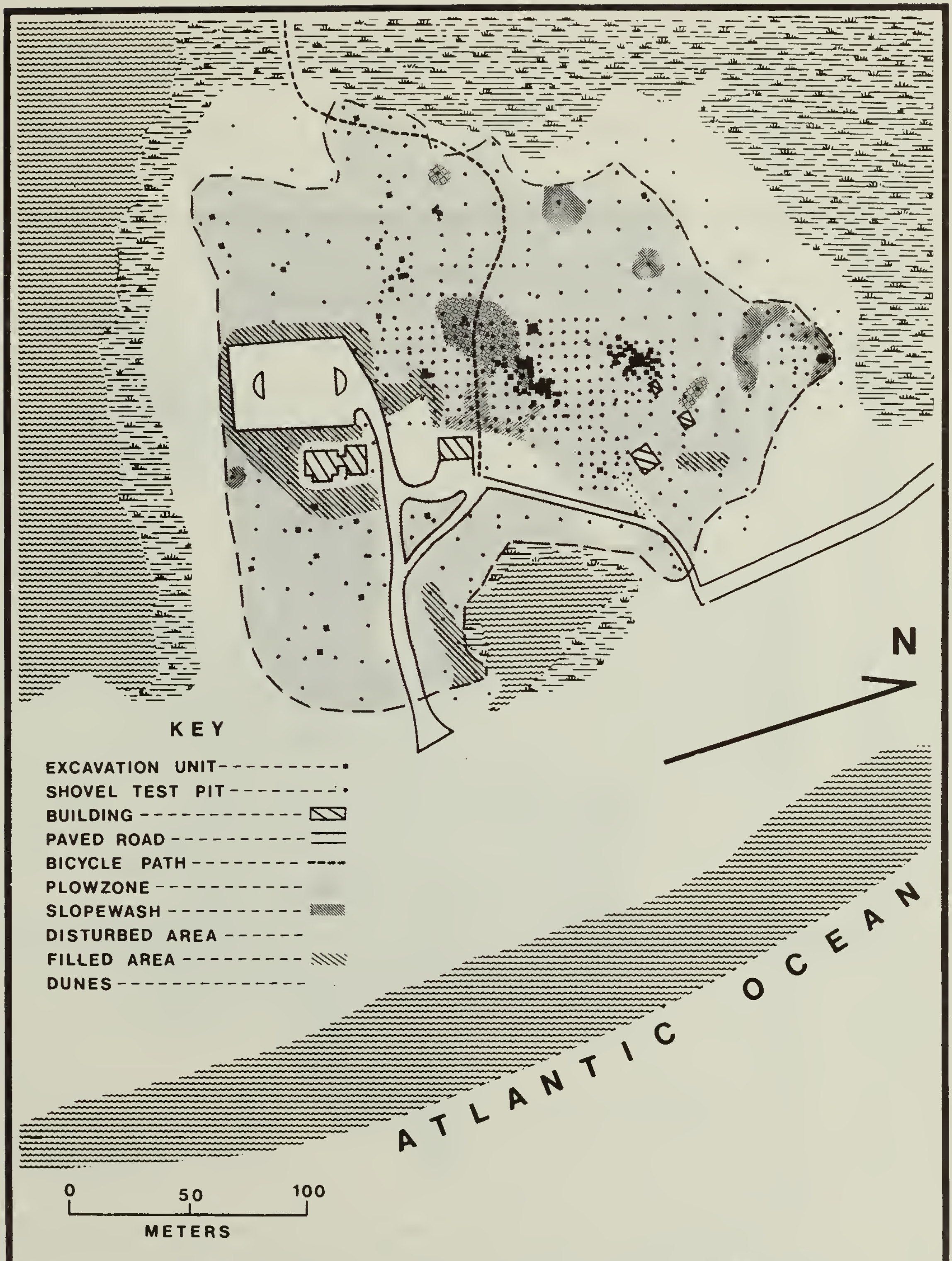
Disturbances and fill are widespread at Coast Guard Beach. Beginning in the late nineteenth century, several dwellings were built there. These were both east and west of the present access road from Doane Road (as of the summer of 1983 only one, the Rothberg house, still stands). The most extensive disturbances result from construction around the Nauset Coast Guard Station (built in 1936-7) and from various National Park Service facilities.

Coastal erosion, averaging 0.8 m/year, is severe at the site. In advance of the eroding cliff, the foredune topping the marine scarp is moving slowly westward, burying archeological deposits.

Coast Guard Beach has no intact shell midden deposits. Low shell abundances in the plowzone imply that the precultivation shell deposits were never extensive.

Truro Wetlands

Sites 19BN355 and 356 appear to be heavily disturbed, as a result of historic period events, including pothunting and nearby gravelling operations. These disturbances make the soil profiles especially difficult to interpret. The A horizon characteristics are generally consistent with a plowzone, and this is how the profiles are mapped here (Figure 7.9). Many of the A horizons seem somewhat leached, possibly as a result of erosion of part of the original profile. Slopewash fills a small kettle hole in the center of 19BN356 and has also been deposited near the bottom of the large kettle to the north of 19BN355. Fill for an old road buries the uncultivated soil of Excavation Unit 2 (Table 7.2) to a depth of about 67 cm.


N
KEY
EXCAVATION UNIT ●
SHOVEL TEST PIT ·
BUILDING ▨
PAVED ROAD ═
BICYCLE PATH ----
PLOWZONE
SLOPEWASH ▨
DISTURBED AREA
FILLED AREA ▨
DUNES
ATLANTIC OCEAN
0
50
100
METERS

Stratigraphy at Coast Guard Beach (19BN374)

G Stillson 7/83

FIGURE 7.8

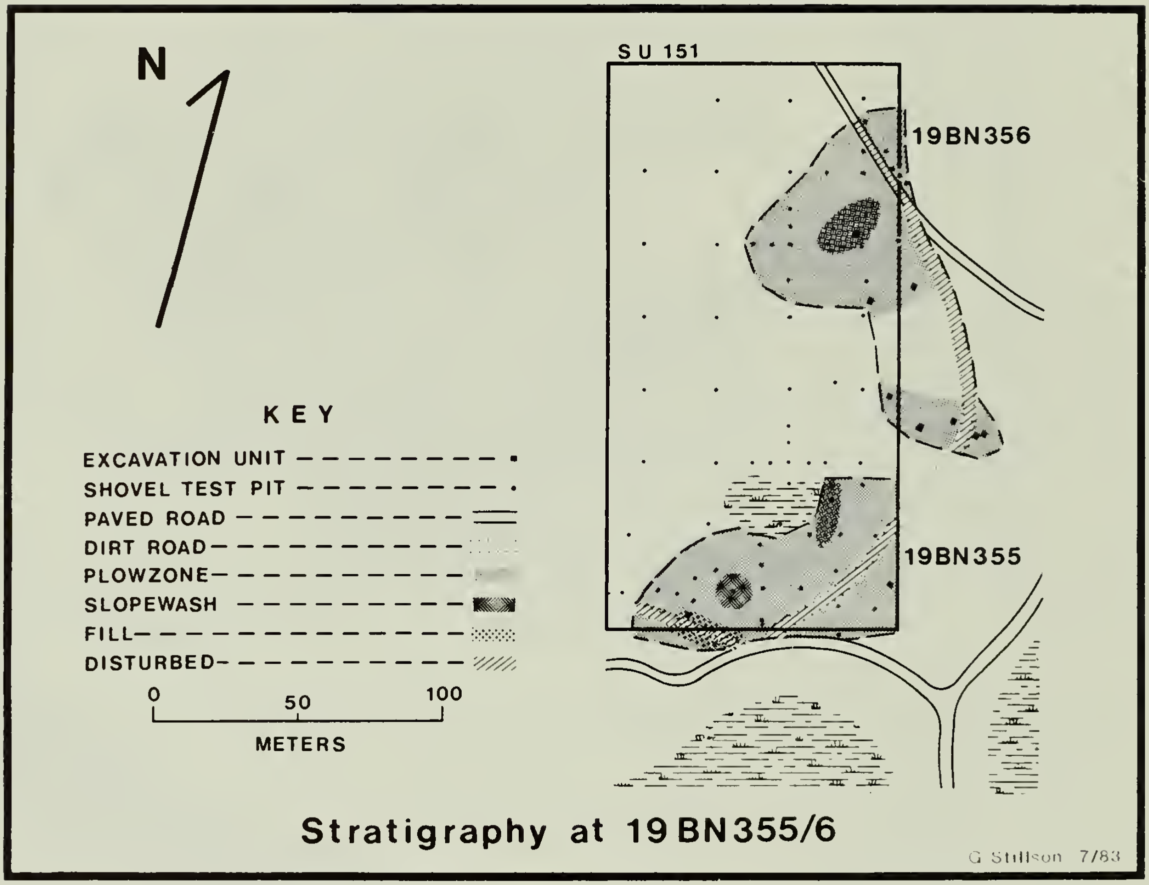

N
KEY
EXCAVATION UNIT
SHOVEL TEST PIT
PAVED ROAD
DIRT ROAD
PLOWZONE
SLOPEWASH
FILL
DISTURBED
0
50
100
METERS
S U 151
19BN356
19BN355
Stratigraphy at 19BN355/6
G Stillson 7/83

FIGURE 7.9

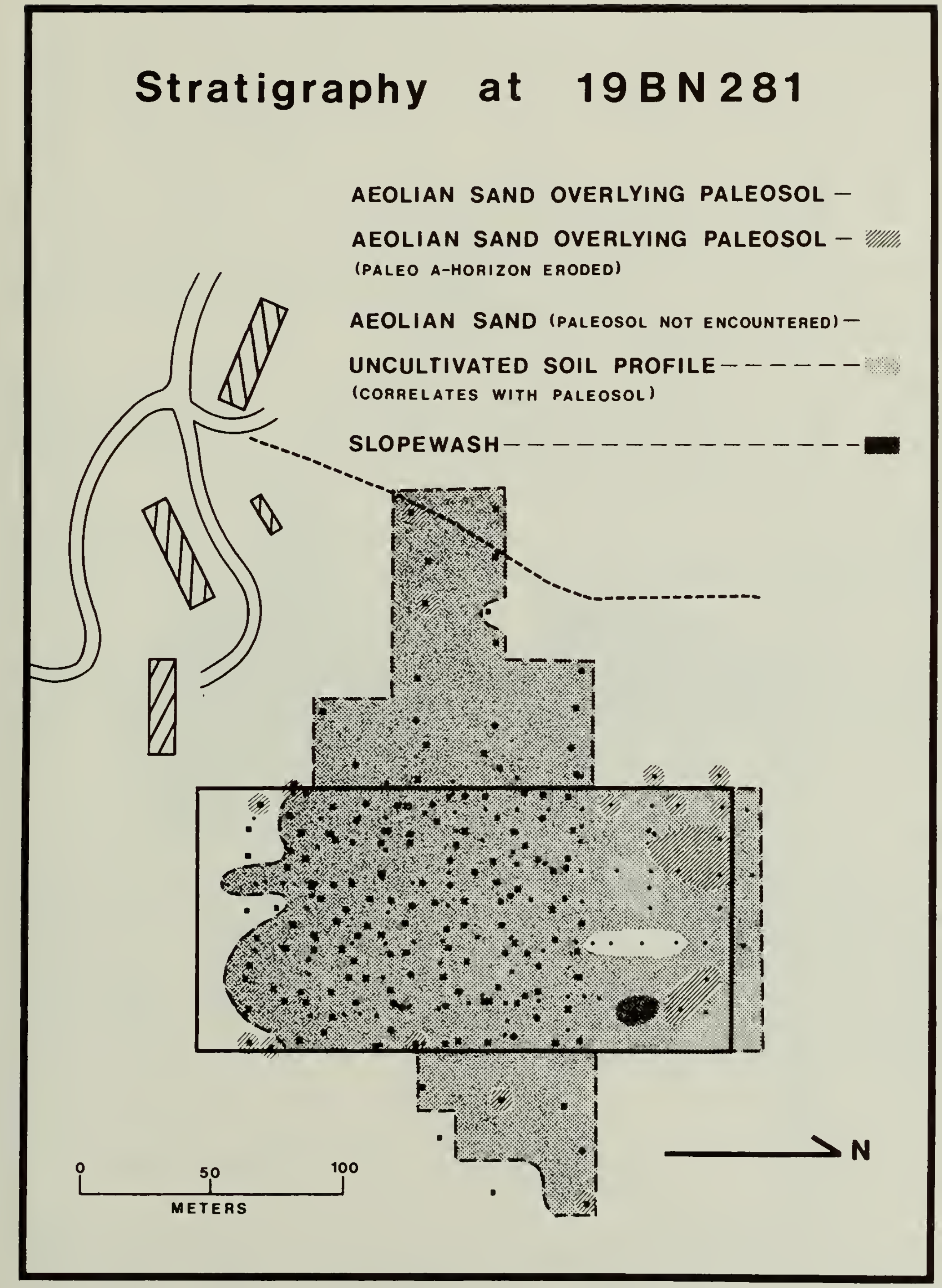

Stratigraphy at 19BN281
AEOLIAN SAND OVERLYING PALEOSOL –
AEOLIAN SAND OVERLYING PALEOSOL – ▨
(PALEO A-HORIZON ERODED)
AEOLIAN SAND (PALEOSOL NOT ENCOUNTERED) –
UNCULTIVATED SOIL PROFILE –––––––
(CORRELATES WITH PALEOSOL)
SLOPEWASH ––––––––––––––––– ■
0
50
100
METERS
N

FIGURE 7.10

High Head

The stratigraphy of 19BN281 (Figure 7.10) has already been discussed several times in this chapter, and the overall characteristics of the major strata are summarized in Tables 7.1 and 7.4. Typical stratigraphic columns show roughly 20-50 cm of aeolian sand overlying a paleosol. The aeolian sand's soil profile is weakly developed, indicating that the sand was deposited recently. About one quarter of the paleosol profiles show A2 and B21 horizons, suggesting that the site has suffered little or no plow disturbance. Such profiles are especially common in the southeast trending swale near the east edge of the sample unit. The uncultivated soil appears to be unburied in a small section of the north-central part of the sample unit. Erosion prior to burial removed the upper part of the paleosol in a few areas. This is most common in the northwest corner of the sample unit. A small deposit of slopewash fills the kettle hole in the northeast corner of the site.

The plowzones of 19BN282/3 (Figure 7.11) are commonly very light and grayish in color. They are also thin, compared to Nauset profiles. This thinness and the bleached appearance may be the result of wind erosion of the original A horizon.

Site 19BN284 is on the face of a steep scarp. Thin profiles result from severe sheetwash and rill erosion down the steep gradient of the face.

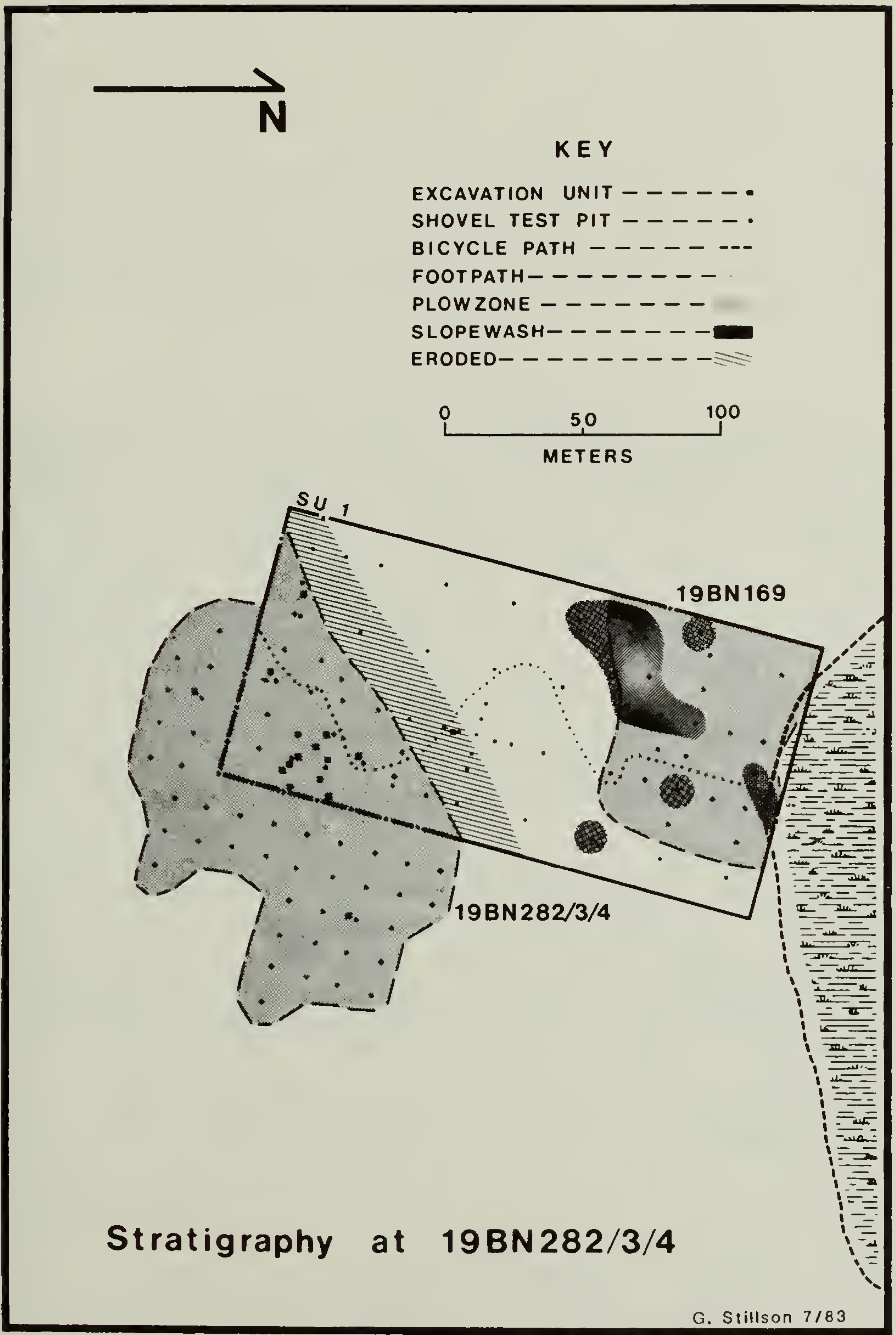
Slopewash deposits cover portions of 19BN169 (Figure 7.11), especially along the base of the scarp. Plowing has thoroughly mixed this sediment into the plowzone. The plowzone is the most common stratum at the site.

Provincelands

Site 19BN410 is a series of thin (10-20 cm thick) shell midden lenses deposited on aeolian sand. Soil profiles are very young, lacking any evidence of B horizon development. These profiles indicate that when the site was occupied, the sand was probably stabilized by vegetation. A paleosol that may correlate with the midden crops out near the shell lenses (Foldout Map M). Today dunes are active at the site.

Discussion

The prehistoric archeological sites in the Seashore share many characteristics in common with other coastal sites in eastern North America. Paradoxically, the depositional processes forming some of the Outer Cape sites closely parallel processes


N
KEY
EXCAVATION UNIT
SHOVEL TEST PIT
BICYCLE PATH
FOOTPATH
PLOWZONE
SLOPEWASH
ERODED
0
50
100
METERS
SU 1
19BN169
19BN282/3/4
G. Stillson 7/83

Stratigraphy at 19BN282/3/4

FIGURE 7.11

acting on some sites in non-coastal upland areas of the Northeast. This parallel arises because the natural geomorphic processes acting on the sites in each setting are nearly identical. Both coastal sites and upland sites share a low rate of natural sedimentation. In this they contrast strongly with sites in many floodplain settings which receive episodic influxes of sediment that tend to bury occupation floors and cause the sites to become stratified.

Sites in upland geomorphic areas, both coastal and non-coastal, have thin stratigraphic units that may compress thousands of years of occupation into a couple of decimeters of profile. Such thin sites are vulnerable to disturbance or complete destruction from modern activities like agriculture and forestry, as the Outer Cape sites so well attest. Many portions of coastal sites also share with non-coastal localities the humid climate acidic soils of the Northeast. These soils frequently preserve only the most durable of prehistoric artifacts: stone tools and pottery sherds.

In coastal sites where natural sedimentation rates are low, people are the major agents of sediment transport, introducing shells, stones and fine sediments onto a land surface. Because of this humanly-transported material, some portions of coastal sites diverge sharply from the depositional characteristics of non-coastal upland sites. Like many coastal sites throughout the world, these portions of the Cape's sites contain stratified shell deposits. Shell middens buffer the acidic soil, helping to preserve faunal remains and bone artifacts. These deposits tend to be stratified, and they may represent a sufficient length of time to contain important chronological information. In a few places on the Outer Cape, the midden deposits are thick enough that plowing and forestry have not thoroughly disrupted them.

From a geomorphic point of view all of the Cape's prehistoric habitation sites and many of its specialized activity loci were in an upland depositional environment when the localities were occupied. Such sites are located at or just below the surface, so shovel test pitting is an effective technique to use in searching for sites. This again parallels conditions in non-coastal upland areas, and contrasts with floodplain sites. Sites in the latter kind of setting may require different survey and excavation strategies from the strategies used at the Seashore.

Although specialized sites, such as fish weirs, were located in the shore zone, most sites were initially in the upland zone. Coastal erosion and sea level rise shifted some of these sites into the shore zone after they were abandoned. In unprotected shoreline areas site burial beneath dunes followed by erosion is likely. The erosion taking place today at Coast Guard and around Wellfleet Harbor are examples of this sequence of events. Burial beneath dune sands hides sites well; subsequent erosion obviously destroys a site's integrity and removes all but the heaviest and most durable artifacts. Sites in protected areas may be flooded and buried beneath salt marshes as the ocean advances against the land. Auger Hole 802 at 19BN308 may provide an example of this. Once a site is buried in a marsh, it is difficult to detect.

As the preceding descriptions have indicated, uncultivated midden and non-midden areas are rare in archeological sites in the Seashore. This is unfortunate, because the alterations of the sites through plowing probably have reduced the extent to which these sites can inform us about Cape Cod's prehistory. Such sites could have been more informative had archeologists been able to examine them before plowing ever touched them. Archeologists who wish to study the Seashore's prehistory do not have the advantages of working only on pristine sites. Some portions of sites have been completely destroyed by recent construction or severe erosion. Plowing has altered the sites in many ways, but with care the plowzone artifact assemblages can yield insights into past human lifeways.

Analysis of such data must keep two concepts firmly in mind: scale and association. Plowing moves artifacts. The fine detail of plowed sites is gone forever, but broad patterns within sites are still present. Comparisons between sites are also entirely reasonable. However, the construction of fine scale artifact patterns in Cape Cod plowzone sites should be viewed with skepticism. In analyzing plowzone sites on the Cape, it is also important to remember that the recovered assemblages are mixtures. Sorting these mixtures into component assemblages requires using taxonomic assumptions imported from areas with better archeological integrity. The assemblages must be created on the basis of assumed similarities with other areas rather than through the physical association of artifacts in sealed context. Such derived assemblages tend to create the illusion of confirming patterns seen elsewhere without actually doing so. Many non-diagnostic artifacts from plowzones must simply be left to float without specific assemblage designations, because they might equally belong to any of several components. Plowing also makes determining the relationship between plowzone artifacts and subplowzone features difficult. Keeping these limitations in mind, analysis of plowzone data can proceed.

This overview has described the general characteristics of seven common stratigraphic units at Cape Cod sites. It has answered fewer questions than it has asked. Among the broad topics that deserve additional attention are:

1. What are useful sedimentary characteristics for differentiating between fill and slopewash when the identification is uncertain?

2. Over what average distances have artifacts in Outer Cape sites been transported by slopewash and by plowing? What precisely is the minimum scale at which spatial analysis is meaningful at Outer Cape sites?

3. In more detail than is presently known, what is the depositional history of artifacts in noncultivated, nonmidden contexts?

4. What is the structure and depositional history of some of the intact midden deposits?

Acknowledgements

My interpretations have benefited from discussions in the field and elsewhere with many people, including Frank McManamon, Elena Filios, Terry Childs, Joyce Fitzgerald, Mary Hancock and various crew members. We retain differences of opinion. Innes Borstel and Martha Pinello read various portions of this chapter and made many helpful suggestions.

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CHAPTER 8

Prehistoric Site Chronology: A Preliminary Report

Christopher L. Borstel
(with an appendix
by Linda Towle)

Prehistory on Cape Cod stretches back at least 9000 years. Scattered hints of Early and Middle Archaic occupations occur, but well-defined components are rare. With the Late Archaic period, archeological evidence becomes considerably more prominent. Sites are more frequent, and artifacts are more abundant within them. The end of the Archaic period is followed by a decrease in the evidence for the activities of prehistoric people. The reasons for this apparent decline during the Early and Middle Woodland remain obscure. Finally, the Late Woodland period once again includes large numbers of sites and artifacts. During this period, horticulture probably gains in importance, and the peoples of this time can be identified generally as the cultural ancestors of the natives encountered by Europeans. The planting of the Puritan colony at Plymouth marks the end of the Woodland period and of the prehistoric archeological record (see Chapters 5 and 6).

These broad patterns roughly outline the prehistoric archeological record at the seashore. The sites and concentrations isolated by the survey can contribute considerable detail to this broad framework. A local chronology forms part of the foundation for both synchronic and diachronic studies of the cultures of Cape Cod´s prehistoric people. Examination of the chronological makeup of the concentrations also provides one means of evaluating the formation processes that created the artifact concentrations.

Lack of a site chronology has limited previous discussions of the results of the survey (McManamon 1981, 1982). The previous absence of a chronological framework was due in part to the cursory nature of the initial testing. At 22 sites small numbers of excavation units now supplement the shovel test pit grids. These excavation units have increased the samples of artifacts and have provided charcoal and shell for radiocarbon dating. These additional materials now provide enough information to begin construction of a chronology of prehistoric sites in the seashore. This chapter summarizes chronological information for these 22 sites and one other (19BN169, excavated by Moffet, tested by the survey, and in Sample Unit 1, along with 19BN282). Chronological data come from projectile point types, ceramics, proportions of lithic materials, and radiocarbon dates.

The regional sequence created by Ritchie (1969a, b), Dincauze (1968, 1971, 1974, 1976), and other archeologists serves as a framework for organizing the seashore's prehistory. Since the survey's data are generally meager, only broad time units are suitable for organizing the chronology. This chapter employs the traditional tripartite division of Northeastern prehistory--the Paleo-Indian, Archaic, and Woodland periods--with the subdivisions early, middle, and late. For better taxonomic resolution the Late Archaic period is subdivided in this chapter into three units of archeological culture: the Laurentian tradition, the Susquehanna tradition, and the small stemmed point tradition, which includes the Squibnocket complex.

A component is defined as the manifestation of an archeological culture or a time period at a site. The areas of 17 of the 23 sites have been divided into subareas called concentrations (see Chapter 3). Since these are the units of analyses in many of the other chapters of this report, site summaries in this chapter note each concentration in which evidence of one of the site's components occurs. Where the summaries identify no components for a concentration, this usually reflects extremely limited excavation in that concentration. At most of the sites, and certainly in many of the concentrations, the summaries list the minimum number of components present. The recognition of new components has been a typical occurrence at sites where the survey has returned for additional excavations.

Although the material provided by excavation units now permits the construction of a temporal framework, many chronological problems remain. As the preceding discussion indicates, the site chronology must be expressed in broad time periods and the enumerations of components are probably incomplete for many sites and concentrations. Another problem is the rarity of intact, stratified deposits on the outer Cape. Many site and concentration assemblages are undifferentiated mixtures of material from several different archeological cultures. Since most of the artifacts are not diagnostic of time period or culture, they must be left with no specific cultural or chronological designation. The component assemblages that can be constructed look flat because they are made up entirely of diagnostic artifacts. The assemblages lack the diversity of artifacts that doubtless existed in the systemic assemblages. Rarity of stratified deposits also means that most of the seashore assemblages depend for their construction on assemblages found at sites outside the study area. This may mask local variations in past cultures and repeat other archeologists' assumptions about the past. These potential biases in component assemblages arise because the groupings of artifacts in the survey's data are not derived from sealed, independent, local contexts.

The chapter is divided into six sections. First, there is a brief review of previous research relevant to Cape Cod's prehistoric chronology. This is followed by a summary of the data categories and criteria used to make chronological inferences about the prehistoric sites. The third section describes the context of 21 new radiocarbon dates from seashore sites and discusses their implications for the chronologies of individual sites. Next come summaries of chronological information for 23 prehistoric sites in the seashore. The chapter concludes with a summary and discussion. Appended to this chapter is a report by Linda Towle comparing the distribution of projectile point types in the survey's collections to their distributions in museum collections from the outer Cape.

Previous Research

Visitors and local residents have long collected prehistoric artifacts on the outer Cape. In Cape Cod, Thoreau (1961:97-98) noted the abundance of artifacts to be picked up in Truro, and surely he was not the first to collect these curios. During the late nineteenth century and through much of the twentieth many collectors were active. Some were casual, such as tourists looking for an afternoon's diversion. Moffett (1946b:17; 1959:1,12) mentions the destruction to the Holden and Small's Swamp sites resulting from such activity. Others were more dedicated and amassed material from a number of sites collected over many years. In response to local finds, professional archeologists took an occasional interest in the outer Cape. Despite this long period of interest in local archeology, systematic treatment of outer Cape chronology is little more than a quarter century old. Until Moffett's 1957 paper no local synthesis had been prepared, and the Cape received scant attention in such regional studies as Willoughby's Antiquities of the New England Indians (1935).

Moffett's 1957 review summarizes the results of his own activities as well as those of other collectors. The paper discusses previously reported material and introduces data on additional sites. The summary is trait-oriented, and Moffett terms his historical subdivisions "periods." Moffett employs the Massachusetts Archeological Society (MAS) typology (Fowler 1953, 1963) to classify his artifacts. Chipped and ground stone implement types and the technology and decoration of pottery provide the major categories of traits to subdivide Cape Cod prehistory (Table 8.1). After brief comments on the Paleo-Indian and Early Archaic periods, Moffett divides the remainder of the Cape's prehistory into five periods--Late Archaic, Early Woodland, Middle Woodland, Late Woodland 1, and Late Woodland 2. Moffett distinguishes Late Woodland 1 from the subsequent period on the basis of differences in ceramics (Table 8.1). Other than this he does not subdivide these broad time periods. Considerable caution should be used in employing his chronological placement of sites, as his plates (1957:Plates 1-7) show numerous examples of artifacts with temporal attributions that differ from those of Ritchie's (1969a,b, 1971).

Beginning in 1962 William Ritchie undertook several seasons of field work on Martha's Vineyard. Completed in 1967, this work formed the core of the research reported in Ritchie's (1969b) volume, The Archaeology of Martha's Vineyard. Ritchie's Vineyard research was an outgrowth of his long years of study of New York archeology (e.g., Ritchie 1944, 1969a). Ritchie (1969b) synthesizes archeological knowledge for southern New England and creates the chronological framework upon which, with additional insights provided by Dincauze (1968, 1972, 1974, 1976), this chapter is based. Ritchie's framework is a "stratigraphically based and radiocarbon-dated succession of culture complexes" (1969b: viii). Such complexes represent sets of distinctive archeological traits, characteristics, or artifact taxa at several levels of inclusiveness (Ritchie 1969a: xxvii-xxxiii; Willey and Phillips 1958:18-43). Ritchie defines two new archeological entities-- the Late Archaic Squibnocket complex (1969b:215-219) and the Early Woodland Lagoon complex (1969b: 224-225)-- and for the rest of his entities he relies upon traditions and cultures defined in New York state.

At about the time Ritchie started his Martha's Vineyard work, Dena Dincauze began her studies of eastern Massachusetts archeology. Among her many contributions to Northeast prehistory, two areas are particularly relevant for the present summary. These areas are her work on the Late Archaic Susquehanna tradition (1968, 1972), and her work on Middle Archaic cultures (Dincauze 1971, 1976). Dincauze's Late Archaic studies include definition of the Atlantic phase, dating about 4100 BP to 3600 BP (1972:56-57), and the succeeding Watertown phase, dating about 3600 BP to 3100 BP (1968:76). These entities are related to Ritchie's (1969a) Snook Kill and Frost Island phases, respectively. All of these phases share a technological tradition (Witthoft 1953), and mortuary ceremonialism is a prominent aspect of the cultural complexes (Dincauze 1975). Notably, one of the cemeteries included in Dincauze's 1968 study is the Coburn site on Barley Neck in Orleans; the Kremp collection from this site is now housed at Salt Pond Visitor's Center in the Seashore.

Dincauze's Middle Archaic work is also significant, for she defined two new archeological entities, the Neville and Stark complexes, dating between about 7700 BP and 6000 BP (Dincauze

TABLE 8.1

Moffett's (1957) Diagnostic Traits for Prehistoric Periods

Late Archaic

Major: gouges, plummets, choppers, spear-thrower weights (bannerstones, etc.), very small stemmed and triangular points, eared points, narrow side-notched points, pentagonal points or knives, and crude (thick, asymetric) blades (i.e., bifaces).

Minor: Stemmed or corner removed points, "occasional" steatite bowls, "some" hafted knives, drills, stemmed and flake scrapers, "rarely" grooved axes; "felsite implements usually have a gray patination" (1957: 1).

Early Woodland

Interior and exterior cord-marked pottery, Vinette 1 (Ritchie and MacNeish 1949; Lopez 1957), stemmed and side-notched points (1957: 4).

Middle Woodland

Vinette 1 pottery usually present, but pottery is predominantly grit tempered and has plain or rocker dentate stamping, cord-wrapped stick impressions or other varied decoration. Pottery is similar to the early Point Peninsula series (Ritchie and MacNeish 1949; Ritchie (1969b: 227) remarks that Moffett's descriptions better fit late Point Peninsula wares). Stemmed points (notably the M.A.S. corner removed Nos. 1-9), side-notched and semi-lozenge points, "early" (small?) triangular points, slate gorgets, small notched pendants, and "most" grooved axes; felsite "materials . . . are not usually patinated" (1957: 5)

Late Woodland 1

Coarse shell-tempered pottery with cord, or fabric impressions or with incised (rarely cord-wrapped stick) decorations. Large, broad triangular points, small triangular points, and broad pentagonal, convex-base, and diamond points or knives; stemmed and notched points rare, but not absent. "Stone axes of the celt type . . . (1957: 5-6).

Late Woodland 2

Major diagnostic is "a relatively thin, fine shell tempered, usually cord-surfaced pottery with a constricted neck and globular body." Stone tools as in Late Woodland 1; occasional European artifacts (1957: 6-10).

1971, 1976). Archeologists now recognize Neville and Stark complex artifacts throughout New England. Such artifacts are distributed across the Cape and Islands (Fred Dunford, Cape Cod Natural History Museum, personal communication, 1983; Massachusetts Historical Commission 1981; Richardson 1983). These complexes push the Cape's prehistory further into the past, and, for New England as a whole, help fill the gap between the Paleo-Indian occupations and the Late Archaic period.

The past decade has seen an explosion of archeological activity in New England. Many new excavations have been conducted and some older collections have received new examinations. Many of these projects, including this project, await full reporting and synthesis. Among the recent studies of coastal areas of Massachusetts and Rhode Island, ones with relevance for regional chronology include Dincauze (1974), Luedtke (1975, 1980), Barber (1982), and Richardson (1983). On the Cape, Marie Eteson and Fred Dunford are organizing a number of Mid-Cape collections through the Cape Cod Natural History Museum in Brewster.

The Massachusetts Historical Commission (MHC) has initiated a statewide survey of archeological collections in museums. This project will provide a valuable management tool for the Commission, but the inventory also has significant research potential. The survey team completed a draft report on material from the Cape and Islands (Massachusetts Historical Commission 1981) (Table 8.2). The taxonomic approach of the MHC survey team differs somewhat from Ritchie's and Dincauze's approaches. Instead of seeking to classify material into phases, complexes, traditions, and cultures, the time ranges of artifacts are of major interest (Anthony et al. 1980). Projectile point types are of special interest, and the MHC survey team has developed a set of type definitions. Although their classification uses existing type names, definitions are not always exact equivalents of the originals. In general the modifications increase the precision of the original definition, but the chronological and, presumably, cultural implications of the type names have been retained.

Sources of Data for Component Identifications

Radiocarbon dates, projectile points, ceramic attributes, and high percentages of some lithic materials all provide data to help build a prehistoric site chronology. Projectile points, pottery and lithic debitage are the most common chronological indicators in the survey collections. Site assemblages may contain a few other diagnostic artifacts not included in these summaries.

TABLE 8.2
Components Present in Moffett Collections from High Head[a,b]

	MHC Inventory Data							Moffett
	MA	LA1	LAss	LAb	EW	MW	LW	(1957: Table 1)
Pilgrim Heights	X	?	X	X	X	X	X	-----
Hillside			X		X	X		MW
Rich			X	X	X	X		LA, MW
Holden		X	X	X	X	X	X	LA, MW
Small's Swamp		?	X	X	X	X	X	LA,MW,LW1,LW2
Warren's Field	X	X	X	X	X	X	X	LA, EW
Pilgrim Spring		?	X	X	X	X	X	MW

[a] Component identifications based upon projectile point classifications of Massachusetts Historical Commission inventory of Moffett collections at R. S. Peabody Foundation for Archaeology in Andover, Massachusetts.

[b] Abbreviations follow those used in text, but as used in the rightmost column these represent Moffett's concepts of these periods, not those concepts used by the NPS Survey.

Radiocarbon Dates

Radiocarbon dates provide relatively precise and accurate determinations of the absolute ages of archeological assemblages. In this chapter radiocarbon dates, by themselves, are not considered sufficient to demonstrate the presence of a component. By themselves dates are taken merely as indicators of possible existence of a component, whose presence should be verified using other kinds of archeological data.

The major reason for this approach toward radiocarbon dates is classifactory. Geologists regard stratigraphic sequences constructed with different kinds of evidence (i.e., different properties) as logically independent of one another. Thus, a sequence based on fossil assemblages at a locality is constructed independently of one based on lithology or chronometric dates. Each of these sequences represents a different classification of the strata at a locality. Only after each type of stratigraphic sequence is constructed should the sequences be correlated with one another (International Subcommission on Stratigraphic Classification 1976:7-11).

This approach is also used in archeology. Units of multisite cultural classification, such as phases, cultures, and the like, are defined on the basis of the presence or frequency of specific artifact types ("diagnostic artifacts" or "traits"). Radiometric ages, determined on individual site assemblages, provide an absolute time frame for these units of archeological culture, but the dates are not used to define the units. Radiocarbon dates tell the archeologist when people were at a site, but not the cultural affiliation of the people. Artifact assemblages (and the units of archeological culture defined by them) tell the archeologist who was at a site but not, by themselves, when. The two kinds of sequence are independent of one another.

Although this chapter does not regard the dates in themselves as definitive of a component, dates are indicators of the _possible_ presence of components. The following rules of thumb have been used to indicate the most likely period to which a date refers, if the sample was not in direct association with an assemblage that included diagnostic artifacts. Dates between 5500 and 3000 BP are indicators of Late Archaic components. Dates ranging from 3000 to 2400 BP imply Early Woodland components. Dates between 2400 and 1050 BP indicate the Middle Woodland period. Dates from 1050 to 350 BP suggest the Late Woodland period. The contact period begins about AD 1600--350 BP.

In applying these rules of thumb, the precision of the dates must be kept in mind. The radiocarbon age represents an estimate of the true age of a specimen. The estimate is based upon the average rate of radioactive decay measured over a finite length of time. The estimate has a degree of imprecision associated with it, expressed as the standard deviation (the plus or minus figure attached to each date). The uncertainty associated with a date means that a radiocarbon assay whose mean falls on one side of the rule of thumb could represent a specimen whose true age lies on the other side of the boundary. As a general principle, dates that fall within one standard deviation of a boundary have a significant probability of representing a true age on the other side of a boundary. Such dates cannot be specifically assigned to either period.

To close this general discussion of radiocarbon dates, a comment is in order about evaluating whether two dates are contemporaneous or not. This evaluation can be made using a Student´s t-test if desired (Spaulding 1958:309; Long and Rippeteau 1974:210-211). However, most of the comparisons in this chapter use a less precise, but quite adequate rule of thumb: two dates are assumed to be contemporary if the ranges between plus one standard deviation and minus one standard deviation of each date overlap (Sanger 1981:38).

Projectile Point Types

Projectile points are bifaces with stems (e.g., Otter Creek side-notched) or are well-thinned bifaces suitable for use as projectiles (e.g., Squibnocket and Levanna triangles). The term "projectile point" is traditional among archeologists, but its use here carries no implied functional inferences. The established regional projectile point types serve as units of classification for the survey artifacts. These are the most direct way of comparing the outer Cape material to other site assemblages. Using types rather than local modes of point manufacture facilitates placement of the concentrations within the existing regional chronological framework. Archeologists widely recognize the dangers of importing projectile point types from near and far. Since type names as used in this chapter serve to indicate only broad temporal units and not specific phases, these dangers are minimized. I have not adopted Anthony et al.´s (1980) sensible approach to small stemmed points; direct comparability with published site reports, and hence temporal specificity, are presently lacking for their approach. Table 8.3 gives the type names, the references for them, and the periods each type represents. A single point of a given type in a concentration is here taken as sufficient evidence to assign the concentration to a component. Alert readers will notice that some types represent only one period, even though much evidence suggests that the distributions in time stretch at one end or the other into an adjacent period. The time periods listed in Table 8.3 are the intervals during which the type is most abundant. In absence of other evidence, an isolated occurrence of a projectile point type is most likely to represent the period during which it was most widely made.

TABLE 8.3

Periods and Projectile Point Types

Period/ tradition	Projectile Point Type	Reference
Middle Archaic		
	Neville	Dincauze 1976:26-29
	Stark	Dincauze 1976:29-37
Late Archaic		
Laurentian tradition		
	Otter Creek	Ritchie 1971:40-41
	Brewerton side-notched	Ritchie 1971:19-20
Small Stemmed tradition		
	Poplar Island	Ritchie 1971:44-45
	Bare Island	Ritchie 1971:14-15
	Wading River	Ritchie 1971:131-132
	Squibnocket stemmed	Ritchie 1971: 126
	Squibnocket triangle	Ritchie 1971: 127-128; Anthony et al. 1980: 9-10
Broadspear tradition		
	Snook Kill/Atlantic	Ritchie 1971:47-48; Dincauze 1972
	Susquehanna broad/ Wayland notched	Ritchie 1971:53-54 Dincauze 1968:23-26
	broadspear (general)	some attributes of above types
Orient		Ritchie 1971:39
Early Woodland		
	Meadowood	Ritchie 1971:35-36
	Lagoon	Ritchie 1971:122
	Rossville	Ritchie 1971: 46
Middle Woodland		
	Fox Creek	as Stubenville-- Ritchie 1971:50-52 see unpaginated preface to that volume; see also Funk 1976:287-288
	Greene	Ritchie 1971:122; Funk 1976:83, 294-295
	Jack's Reef	Ritchie 1971:26-28
Late Woodland		
	Levanna	Ritchie 1971:31-32; Anthony et al. 1980: 9-10

Note: Anthony et al. (1980) and Kinsey (1972:399-447) provide supplemental descriptions for many of these types. Classification follows Anthony et al.'s (1980:9-10) criteria for distinguishing among Squibnocket, Levanna, and Madison triangles.

Table 8.4 lists frequencies of point types by sites and concentrations. The table is organized according to the geographic location of the sites, from south to north. Since the table lists all projectile points in the survey collection, it incluses data from six sites not described in the site summaries. Two of these are private collections that were donated to the survey. The collection from 19BN194 is from the Fort Hill area. Most of the material was collected by Lewis Collins early in the century. Elizabeth Northing donated the collection to the survey. The collection also includes two artifacts collected by Moffett during his 1962 survey of the Seashore (Moffett 1962). The second collection, 19BN417, was made by Dr. Harold Whitlock in his garden. The site overlooks Nauset Marsh about 300 meters north of 19BN333/6/7. Two sites are isolated finds near Wellfleet center. Both artifacts were found adjacent to buildings, so they may have been transported to their findspots in loads of construction fill. Site 19BN417 is on the upper reaches of the Herring River wetlands, about one kilometer west of 19BN471. The second isolated find 19BN310, is near Featherbed Swamp in south Truro, about 1.6 km north of 19BN471. Of the remaining two sites, 19BN290 is a small low density site in Sample Unit 43 on the Pamet River in Truro. Site 19BN479 is in the High Head area. It is in the eastern part of Sample Unit 202 (Foldout Map K).

Ceramics

This chapter's site summaries incorporate Childs's comments on prehistoric pottery (see Chapters 13 and 14). She bases her interpretations on a range of stylistic and technological attributes, summarized here. In Chapter 13 Childs cautions that her temporal attributions for the survey's pottery are subject to revision as archeologists learn more about the social, economic, psychological, and technological aspects of change in prehistoric Northeastern ceramics. She also notes that single ceramic attributes are rarely useful as chronological indicators. Clusters of attributes on sherds or vessels are far more diagnostic.

Exterior and interior cordmarked, grit-tempered pottery, including Vinette 1 wares (Ritchie and MacNeish 1949:100), are characteristic of Early Woodland ceramic assemblages. Middle Woodland pottery shows a diversity of surface treatments, including linear dentate, rocker dentate, punctate, cord-wrapped stick, incising and, on Cape Cod, impressions made with scallop (Argopecten irradians) shells. Middle Woodland pots are typically grit-tempered, but shell-tempered vessels also occur. Late Woodland pots are usually shell-tempered. Extensive cord-marking on vessel exteriors is common, and surfaces also show such decorative elements as incising, cord-wrapped stick impressions, and dentate stamping. Interior walls are often extensively scraped. The latter part of the Late Woodland period is marked by the appearance of globular vessels with constricted

TABLE 8.4

Projectile Point Types

Site Conc.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	Total
308.00																					2		2
.11																					1		1
.14																		1			2	1	4
.24																					1		1
.33																		1			3		4
.41										1				1								1	3
.43																				1		3	4
.51										5												1	6
194.00	1						3	3	1	4					1					?1	1	16	31
323.21												1					?1				2		4
.22																					2		2
.23																					3		3
.24																					1		1
340.00										1													1
274.11										1													1
.12			1							4										8	3	1	17
.22					1																		1
273.11									1														1
341.21										4											5	3	12
.22																					1		1
.23								1				2				?1					5	3	12
.24										3											14	2	19
288.00										1											1	2	4
.21							1																1
.22																					1		1
.42																					?1	1	2
390.00														1									1
.22																?1							1
.33								2				?1					1				1	1	6
.36						1																	1
336.11										1								1			1		3
417.00				?1							1?		1		1						1		5
374.00		?1																			1	1	3
.11													1						1				2
.21												2									1		3
.43																					1		1

Site Conc.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	Total
374.44																					2	4	6
.45																					1		1
.46																					1		1
.51																					1		1
.54																					1		1
.62										1													1
.66																					1		1
387.00																					4		4
418.00	1																						1
471.00																1	1	1					3
310.00									1														1
290.00																						1	1
355.12								1															1
356.21																						1	1
479.00							1																1
282.24																						1	1
.41																				1			1
281.00									2														2
.13																						1	1
.15																						1	1
.24										1													1
.31																						1	1
.33																						1	1
.41								?1															1
.43								1															1
.44							1																1
.46							1	1	1													1	4
.48																						1	1
415.00						3	1					1				?2						6	13
353.00										1													1
410.00																					3		3

Key: A-Neville; B-Stark; C-Otter Creek; D-Brewerton Side Notched; E-Poplar Island; F-Bare Island; G-Wading River Stemmed; H-Squibnocket Stemmed; I-Small Stemmed, other; J-Squibnocket Triangle; K-Snook Kill/Atlantic; L-Susquehanna Broad/Wayland Notched; M-Broadspear, other; N-Orient Fishtail; O-Meadowood; P-Lagoon; Q-Rossville; R-Fox Creek (Stemmed & Lanceolate); S-Greene; T-Jack´s Reef (Corner Notched and Pentagonal); U-Levanna; V-untyped; ?-Uncertain identification necks or castellations, thin walls, and fine shell temper. The castellations and collars frequently have elaborate incised and dentate-stamped designs.

Lithic Raw Materials

Chapter 15 describes the prehistoric use of lithic materials. High proportions of quartz, chert, or weathered felsic volcanics may indicate the presence of certain components in a concentration. The precise value of "high percentage" varies from material to material. For each material a threshhold value can be set below which no reliable chronological inferences can be made. This threshold is based upon the frequency distributions of the percentage values. Percentages of materials, however, are also likely to be unreliable if the assemblage includes less than 100 lithics (see also Chapter 9). The site summaries use percentages of materials to make chronological inferences only if the assemblages include 100 or m ore lithics.

Assemblages with over 10% quartz are likely to include Late Archaic small stemmed components. Quartz appears to be the most reliable chronological indicator of the three materials.

Chert percentages of 1% or more may indicate a Middle Woodland component. Since the absolute number of chert lithics is quite small in almost all concentrations (usually under five), this criterion often must be used with caution.

A value of 5% or greater for weathered felsic volcanics could be taken, tentatively, to suggest the existence of an older (i.e., pre-Late Woodland) component. This is the least reliable criterion because many factors may contribute to the rate at which felsitic rocks weather.

The reliability of these criteria increases with larger total sample sizes and higher percentages of the material of interest. These criteria will not identify every concentration with one of these components, since the percentages are relative to the total number of lithics. All artifacts of a chronologically sensitive material may have been produced by one component at a site, but the proportion of this material may be less than the value for its threshold of reliability if other materials (for the same or other components) are very abundant. Finally, these inferences about chronological position apply only to assemblages of artifacts, and not to individual specimens. Tables in Chapter 15 give the specific values for those concentrations exceeding each material's thresholds.

Radiocarbon Dates: Provenience and Contexts

Sample Selection and Treatment

The survey has begun an extensive program of radiocarbon dating. This program seeks not only to obtain ages for stratigraphically-controlled artifact assemblages, but also to obtain them on the debris of past human activities that may lack associated diagnostic artifacts (e.g., shellfish collecting as an activity, in and of itself). The program attempts to cover as wide a range of sites as possible and to obtain ages for concentrations otherwise lacking in chronological indicators. Sample selection criteria are liberal to insure that the survey obtains the maximum amount of information about the absolute chronology of the Seashore's prehistory. Criteria used to collect samples include: the availability of suitable material in sufficient quantity, the research priority of the question the date will address, and the context of the samples. The major contextual criterion is that the source stratum or feature show no evidence of physical intrusion by later deposits. The co-occurrence of diagnostic artifacts and the sample in a sealed context, while desirable, is not a decisive factor in the selection of a sample. McManamon and Borstel selected the samples for dating in consultation with Fitzgerald, Childs, and other staff members.

Twenty-three samples have thus far been dated as part of this program. Dated materials include shell, bone, and charcoal from several sources. Three samples (all charcoal) were collected in the field specifically as samples for radiocarbon dating. Eleven samples (including two combined with field C-14 samples) come from soil processed by water flotation (see Chapter 10). Eight samples (all shell) are from material collected in the screen during excavation (this source is called general excavation below). The bone samples from 19BN387, initially reported in Bradley et al. (1982), come from the general excavation of the ossuary, but were collected _in situ_, not in the screen.

Post-excavation contamination of samples is not a serious problem. Staff members use only clean tap water for washing and for flotation. All samples are dried promptly at room temperature to avoid mold growth. No preservatives have been applied to samples. Procedures in the collection of artifacts from the screen and in the sorting of flotation fractions aim to avoid the mixing of large fragments of cultural material from different proveniences. Cross-contamination of samples by tiny particles may well have occurred, but radiocarbon laboratory pretreatments should eliminate them. These pretreatments should also eliminate any contamination resulting from the direct contact of the sample with hands during the cleaning and sorting of materials (Charles Sullivan, Geochron Laboratories, personal communication, 1983).

Geochron Laboratories of Cambridge, Massachusetts, has made all radiocarbon assays for the project that are reported here. Survey material was given standard pretreatments. The reports on the individual samples (on file at Division of Cultural Resources, North Atlantic Regional Office, National Park Service, Boston) describe these pretreatments as follows.

For charcoal:

> The charcoal fragments were separated from any sand, silt, rootlets, or other foreign matter. The sample was then treated with hot dilute HCl and with hot dilute NaOH to remove carbonates and organic contaminants. After washing and drying, the charcoal was then combusted to carbon dioxide for the analysis.

For shell:

> The shells were cleaned thoroughly in an ultrasonic cleaner. They were then leached thoroughly with dilute HCl to remove additional surficial material which may have been altered, and to be sure only fresh carbonate material was used. The cleaned shells were then hydrolyzed with HCl, under vacuum, and the carbon dioxide recovered for the analysis.

The following sections report new age determinations for 21 samples. The provenience code is a trinomial system consisting of:

test unit number-feature number-level number.

The radiocarbon ages are based upon the Libby half life of 5570 years for C-14. The age in radiocarbon years before present (BP) is referenced to the year A.D. 1950. The error is plus or minus one sigma as judged by the analytical data alone. Geochron's modern standard is 95% of the activity of National Bureau of Standards Oxalic Acid. Pee Dee belemnite serves as the standard for C-13 values. Shell ages are corrected for carbon isotope fractionation. No corrections are applied to any of the dates for variations in the abundance of C-14 in the atmosphere.

_19BN308_ _Dates_ (Figure 8.1)

Provenience: 802-00-052 _Concentration_: 308.00

Age (Lab No.): 3925 ± 180 BP (GX-9703) (δ C-13= 1.9 o/oo)

Material: 12.9 g _Mercenaria mercenaria_, 19.1 g _Mya arenaria_, and 50.3 g mixed bivalve shells (mostly _Mercenaria_, _Mya_, and _Spisula_ (?))

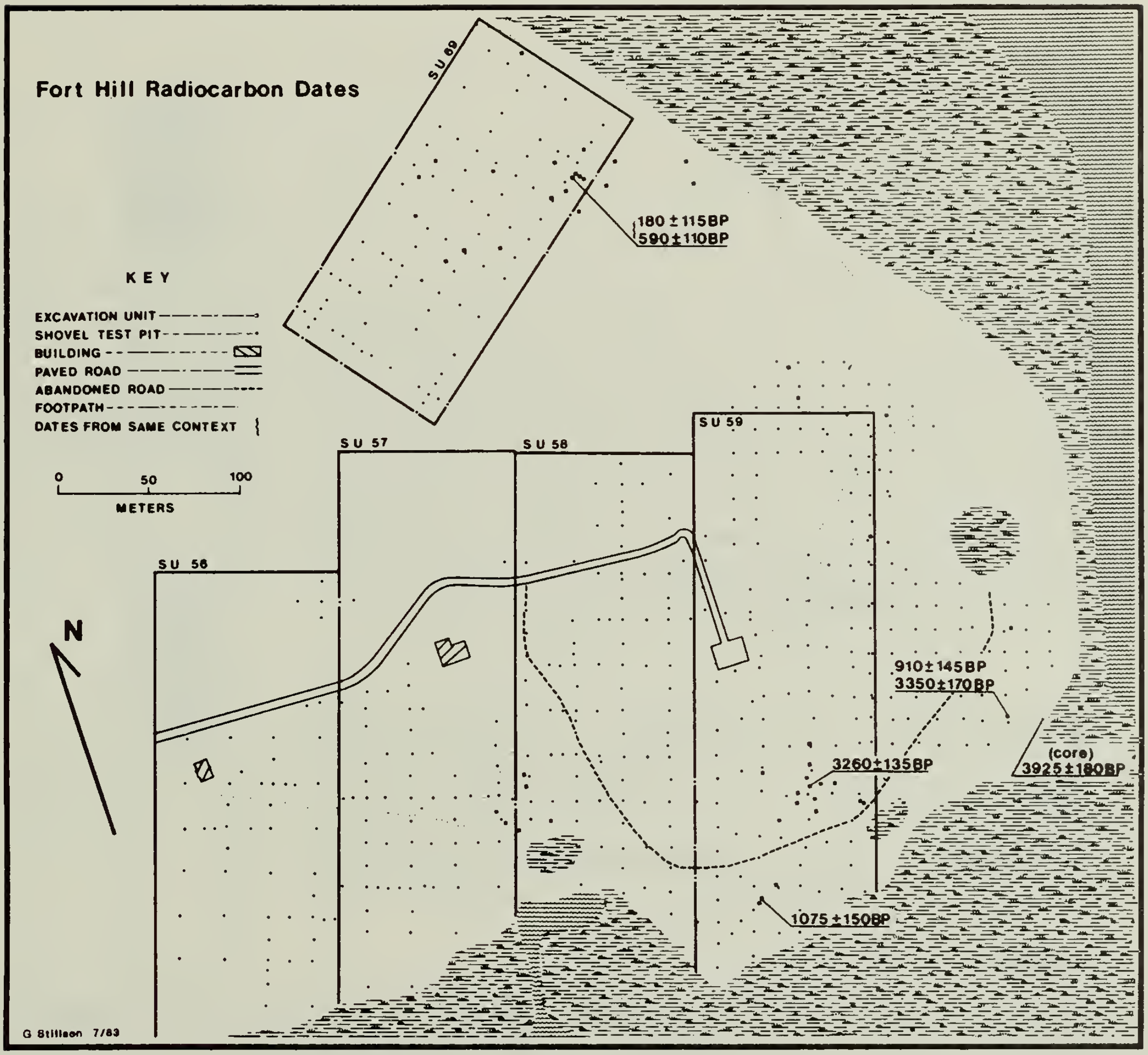

Fort Hill Radiocarbon Dates
KEY
EXCAVATION UNIT
SHOVEL TEST PIT
BUILDING
PAVED ROAD
ABANDONED ROAD
FOOTPATH
DATES FROM SAME CONTEXT
0
50
100
METERS
N
SU 69
SU 56
SU 57
SU 58
SU 59
180 ± 115BP
590 ± 110BP
910 ± 145BP
3350 ± 170BP
3260 ± 135BP
(core)
3925 ± 180BP
1075 ± 150BP
G Stillson 7/83

FIGURE 8.1

Source: General excavation

Context and associations: Test unit 802 is an auger hole 15.9 m southeast of Excavation Unit 300. The auger hole is near the edge of the salt marsh, slightly below the elevation of the highest monthly tides. Figure 8.2 summarizes the stratigraphic column of the auger hole. GX-9703 is a subsample of the material from the 52-66 cm level.

This level also produced one flake and several small bone fragments, which indicate that the shell is from a man-made deposit. The sequence of stratum colors and textures beneath 40cm in the auger hole is similar to soil profiles in the terrestial areas of 19BN308 (Figure 8.2). This suggests that the shell deposit is *in situ* and not eroded and redeposited. A terrestial environment of deposition is certainly plausible, based on the radiocarbon date of 3925±180 BP, and on the location of sea-level, about 8m below its present level, at 4000 BP (Oldale and O´Hara 1980:Figure 2). The stratigraphy also bears some similarity to the upward sequences of marine transgressions. This alternative interpretation would imply that the deposit is man-made, but was formed by dumping shells and other debris into shallow water rather than onto dry land (R.N. Oldale, written and oral communication 1984). Further borings or other excavations will be needed to resolve the depositional history, but the auger hole does provide evidence that archeological deposits may be buried beneath some parts of Nauset Marsh.

Provenience: 300-00-052 Concentration: 308.33

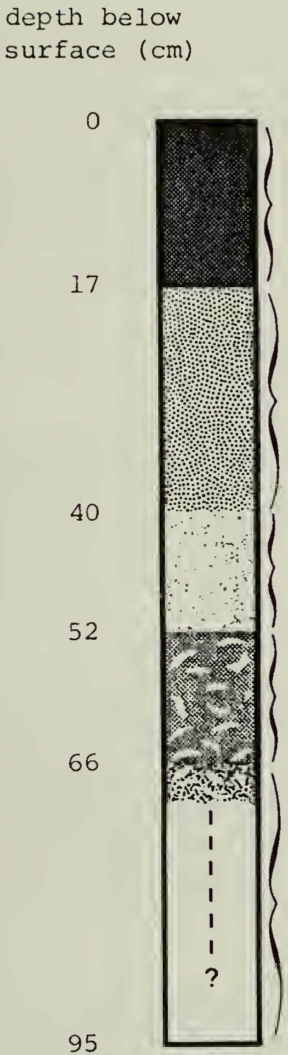
Age (Lab No.): 910 ± 145 BP (GX-9701) (δ C-13= -0.2 o/oo)

Material: 100.4 g *Mercenaria mercenaria* shell fragments

Source: General excavation

Context and associations: Level 052 was the uppermost undisturbed layer of shell midden in Excavation Unit 300. Plowzone mixed with slopewash truncated the midden above 52 cm; the level was underlain in most of the excavation unit by a thin, well-sorted sand layer, probably a storm deposit. Level 052 ranged in thickness from 1 cm to 5 cm. GX-9701 is a subsample of the shell collected in the screen from the entire excavation unit in this level.

This level was dated because it was at the top of 50 cm of intact midden. Of 29,900 g of shell, *Mercenaria mercenaria* and *Mya arenaria* were most common, accounting for 12,900 g and 10,300 g, respectively. *Crassostrea virginica* was absent. Seven fire-cracked rocks, weighing 274 g, also came from this level. This level produced 196 flakes. No diagnostic lithic artifacts



Peat: dark brown clayey silt; no sand.

Peaty sand: black well-sorted medium-coarse sand; samll amounts of silt and gravel also present.

Sandy mud: black moderately sorted sandy silt.

Shell midden: black sandy silt; shell fragments abundant; 1 flake; some small bone fragments.

Radiocarbon date:
3925 ± 180 BP
(GX-9703)

Unable to bring sediment to surface with augur; upper portion of this interval consisted of poorly sorted sand with shell fragments.

Water-logged B horizon? Soil on augur blade from deepest drive dark yellowish gray; moderately sorted medium-coarse sand.

Stratigraphy of Auger Hole 802, 19BN308

Figure 8.2

were excavated, but two slightly deeper levels, 053 and 060, produced fragments of three Levanna points (one from 053 and two from 060). Levels below 052 produced 11 sherds, including 10 shell-tempered.

This radiocarbon age is consistent with other radiocarbon assays on Late Woodland in southern New England, including Ritchie's (1969b) dates from Martha's Vineyard. The two dates in Excavation Unit 300 (this one and GX-9702, at the bottom of the midden) are consistent with their respective stratigraphic positions. The position of this sample implies that the Levanna points from Excavation Unit 300 date to 910 ± 145 BP or earlier. This radiocarbon age is statistically contemporaneous with a date of 1075 ± 180 BP from Excavation Unit 202.

Provenience: 300-00-094   Concentration: 308.33

Age (Lab No.): 3350 ± 170 BP (GX-9702) (δ C-13= 1.2 o/oo)

Material: 111.6 g *Mercenaria mercenaria* shell fragments

Source: General excavation (wet screened)

Context and associations: Level 094 was the lowest level in the shell midden in Excavation Unit 300. The level averaged 4 cm thick, except in the southeast corner, where the base of the midden dipped. Beneath this level was B-horizon soil. Feature 9, a group of burned granite cobbles, overlay the northeastern part of this level. Due to proximity of the watertable, the soil in this level was very wet and had to be washed through .25 in. mesh sieves to screen it. GX-9702 is a subsample of the shell collected in the screen from the entire level.

This level was dated because it was the lowest level in the midden in Excavation Unit 300. The level produced nine flakes, none of which were quartz. Shell amounted to 10,500 g, including 3100 g *M. mercenaria*, 200 g *Crassostrea virginica*, and 2300 g *Mya arenaria*. Eighty-four pieces of fire-cracked rock, weighing 5619 g, were recovered. No diagnostic artifacts came from this level.

The radiocarbon assay suggests that the midden began building during the Late Archaic period. The two dates from this excavation unit (this one and GX-9701, at the top of the intact midden) are consistent with their respective stratigraphic positions. The date is statistically contemporaneous with a date of 3260 ± 135 BP from Excavation Unit 107, 116 m to the west.

Provenience: 107-06-061 Concentration: 308.42

Age (Lab No.): 3260 ± 135 BP (GX-9700) (δ C-13= -0.5 o/oo)

Material: 153.8 g *Crassostrea virginica* shell fragments

Source: Water flotation

Context and associations: Feature 6 was a lens in the intact shell midden in Excavation Unit 107. Such lenses seem tobe the products of single depositional events. Feature 6 contained an abundance of oyster (*Crassostrea virginica*) shells, making it distinguishable within the midden. The feature was at the bottom of the midden and rested in a submidden depression. Excavators first recognized the feature at about 51 cm, nearly 20 cm into the intact midden. GX-9700 is a subsample of shell recovered by flotation from the lowest level of the feature.

Flotation produced over 13,000 g of shell, over 7000 of which could be assuredly identified as *Crassostrea virginica*. Thirty-one flakes came from the feature, including 14 of quartz. Very little else came from the feature: 2 g of bone, 63.9 g of fire-cracked rock, and a few carbonized and noncarbonized seeds. The excavation unit produced no diagnostic lithics. Higher levels in the midden and the plowzone produced some ceramics, mostly shell-tempered material.

This radiocarbon assay would appear to relate to a Late Archaic component. Lack of diagnostic artifacts does not allow confirmation, but the high proportion of quartz lithics, 45%, from the feature supports this interpretation. The date is statistically contemporaneous with one of 3350 ± 170 BP from Excavation Unit 300, 116 m to the east.

Provenience: 202-00-030 Concentration: 308.51

Age (Lab No.): 1075 ± 150 BP (GX-9704) (δ C-13= -0.6 o/oo)

Material: 11.2 g *Mercenaria mercenaria* and 11.4 g mixed species (<0.5 in. shell fragments)

Source: General excavation

Context and associations: Level 030, extending from 30 to 40 cm BS, was the lowest level within the plowzone in Excavation Unit 202. GX-9704 is all the shell collected in the screen from this level.

Level 030 produced three quartz Squibnocket triangular projectile points (another one came from 040) and had the highest frequency of lithics of any level in the unit. Seven percent of the 413 lithics from the level were quartz. A high quartz percentage (11.8% of 1125 lithics) characterizes the concentration as a whole. Twenty-six shell-tempered sherds, weighing 6.1 g, came from this level. Fire-cracked rock totaled 4923 g (513+ fragments). The abundance of artifacts suggests that plowing may have destroyed a feature at this depth, but excavators noted no soil discolorations. The high frequencies of artifacts in this level suggested that the plowing had not completely mixed the archeological deposit.

Radiocarbon dating of the shell sought to fix the age of the Squibnocket triangles. The radiocarbon date appears to be much too late to be associated with the projectile points. Ritchie calls these points "a definite trait of the Squibnocket complex" (Ritchie 1971:127), and he associates them with a date of 4140 ± 100 BP (Y-1529) from Stratum 3 at the Hornblower II site (1969b: 25, 52, 55). Treating the assay as a Late Woodland date seems appropriate. Perhaps it is associated with the shell-tempered pottery. The date is statistically contemporaneous with the date of 910 ± 180 BP from Excavation Unit 300.

19BN323 Dates (Figure 8.1)

Provenience: 20-01-040 Concentration: 323.22
20-01-045

Age (Lab No.): 180 ± 115 BP (recent) (GX-9553)

Material: 3.91 g wood charcoal (species not identified)

Source: Water flotation

Age (Lab No.): 590 ± 110 BP (GX-9554) (δC-13= +1.2 o/oo)

Material: 106.11 g *Mercenaria mercenaria* shell fragments

Source: Water flotation

Context and Associations: Feature 01 in Excavation Unit 20 is a large shell lens that extended to the east of Excavation Unit 20 and into Excavation Unit 12 to the northeast. Excavators identified the lens as a distinct deposit at the base of the plowzone. Shell abundance sharply increased in the lower portion of the plowzone, and this suggests that the upper portion of the feature was destroyed by plowing. Only the portion of the shell lens that extended into the B2 horizon appeared to be intact. At the base of the plowzone the feature approximately covered the eastern third of the 1.5 m x 1.5 m excavation unit, and the shell lens reached a maximum thickness below the plowzone of 19 cm. A variety of species of molluscs and gastropods are represented by the shell fragments, but Mercenaria mercenaria predominates. Soil in the feature was a very dark grayish brown (10YR3/2) silty fine sand. The shell lens appeared to be homogenous in color, texture, and shell density. A filled-in rodent burrow ran beneath the feature, but it did not penetrate the shell lens.

GX-9553 is a combined charcoal sample, put together from charcoal recovered through flotation of four feature proveniences: 20-01-040 (S section), -040 (N), -045 (S), and -045 (N). Level 040 provided 1.4 g of the sample and level 045 gave 2.51 g. GX-9554 is a subsample of Mercenaria shell recovered through flotation of 20-01-045 (S section).

Sorting of flotation residues from this feature is incomplete. Directly associated materials include shell, flakes, a few sherds, and fire-cracked rock. Sherds from vessel lot 7 (see Chapter 14) were recovered from both inside and outside the feature. This vessel is cord-marked and shell-tempered, two characteristics of Late Woodland pottery. The plowzone in Excavation Unit 20 and adjacent units yielded both shell- and grit-tempered pottery and two Levanna triangles. An immature corn kernel was recovered from Feature 02 in the western portion of Excavation Unit 20.

The two ages on samples from the same context differ by more than 400 years. The shell date of 590 ± 110 BP is consistent with the Late Woodland artifacts found in Concentration 323.22. The date on charcoal of 180 ± 115 BP suggests the feature is post-Contact, which is not substantiated by the associated artifacts. Perhaps some undetected disturbance mixed the older shell with the younger charcoal. Alternatively, perhaps historic period charcoal fragments filtered down to the level of the samples through interstices between shells in the feature. A third possibility is that the shell and charcoal was actually an unrecognized historic period deposit of shell and charcoal with a residual admixture of Late Woodland artifacts. If this is so, then the direction of the difference between the shell and charcoal dates is consistent with two other pairs, one from 19BN274/339 and the other from 19BN341.

19BN274/339 Dates (Figure 8.3)

Provenience: 23-01-027 (SE section)   Concentration: 274/339.12

Age (Lab No.): 1265 ± 130 BP (GX-9550)

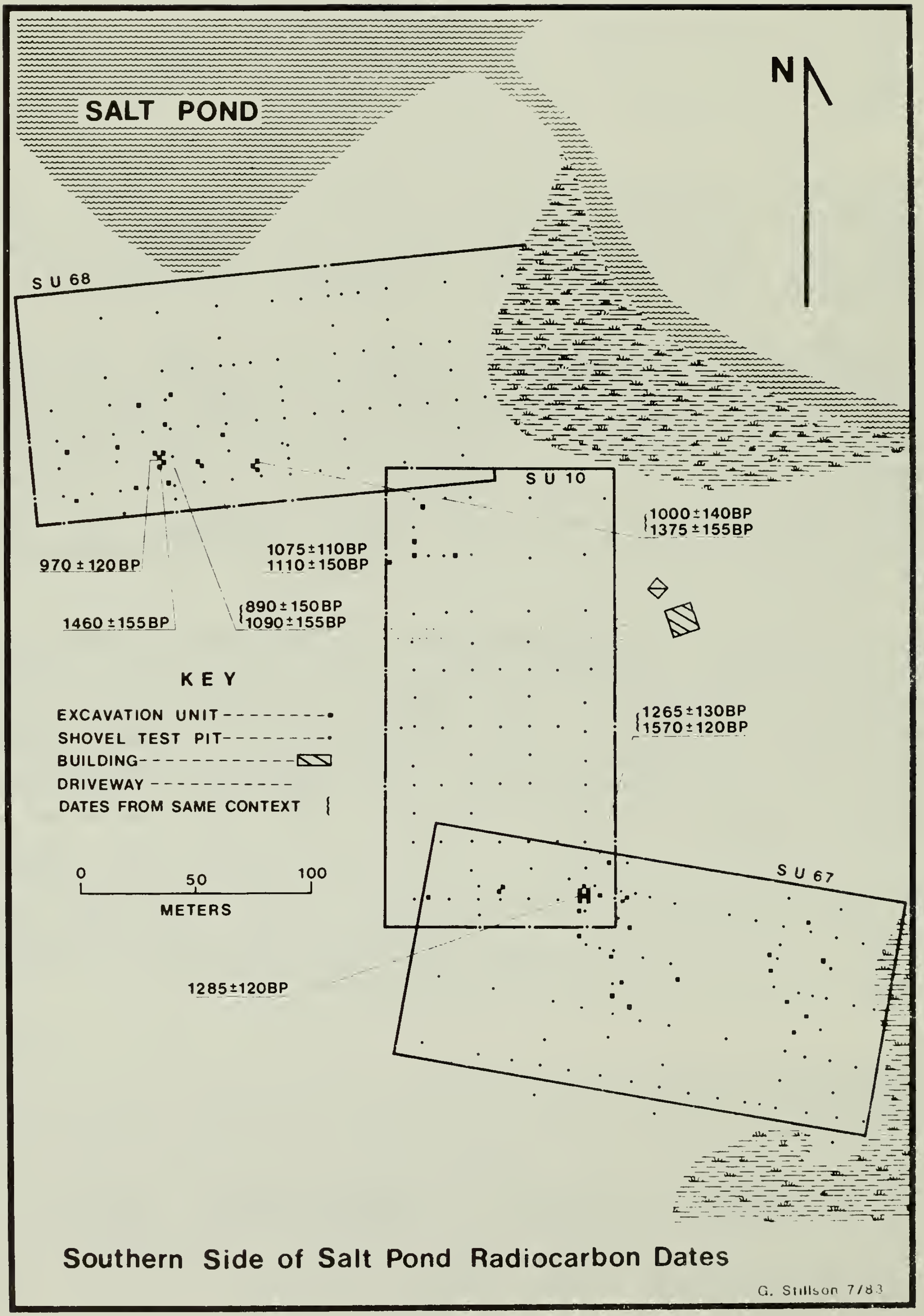

SALT POND
N
S U 68
S U 10
S U 67
970 ± 120 BP
1460 ± 155 BP
890 ± 150 BP
1090 ± 155 BP
1075 ± 110 BP
1110 ± 150 BP
1000 ± 140 BP
1375 ± 155 BP
1265 ± 130 BP
1570 ± 120 BP
1285 ± 120 BP
KEY
EXCAVATION UNIT
SHOVEL TEST PIT
BUILDING
DRIVEWAY
DATES FROM SAME CONTEXT
0
50
100
METERS
Southern Side of Salt Pond Radiocarbon Dates
G. Stillson 7/83

FIGURE 8.3

Material: 5.74 g wood charcoal (species not identified)

Source: Taken as radiocarbon sample

Age (Lab No.): 1570 ± 120 BP (GX-9551) (δC-13 = +2.0 o/oo)

Material: 101.06 g *Mya arenaria* shell fragments

Source: Water flotation

Context and Associations: Feature 01 was a small plow-truncated pit that was found in Excavation Units 16 and 23. Excavators first recognized the feature at the base of the plowzone, and the intact portion of the feature extended into the yellowish brown (10YR5/4) B2 horizon. The pit was roughly oval (49 cm x 33 cm) and included two layers of fill: an upper shell lens and a zone beneath with abundant charcoal. The upper 2 cm of the shell lens was composed of finely crushed bluish shell, probably burned *Mytilis edulis*. Valves and fragments of *Mya arenaria* in a matrix of dark grayish brown (10YR2/2) silty fine sand made up the bulk of the upper layer. Scattered charcoal fragments occurred throughout the shell lens, and these fragments became more abundant with depth. The lower fill layer was dark grayish brown silty fine sand with mottles of brown B-horizon-like soil. Charcoal flecks and lenses were abundant in the lower layer, and shell fragments, though present, were infrequent. The soil surrounding the feature did not show any discoloration resulting from burning.

The boundary between the two layers did not mark an abrupt change in fill characteristics, except that little shell was present in the lower layer. Both layers shared a soil with similar color and texture and charcoal gradually increased in abundance with depth in the shell layer. These observations imply that the two strata were deposited in a single event.

Sample GX-9550 is a single piece of carbonized wood from the lower feature layer, and GX-9551 is a subsample of the shell collected by water flotation. Both samples come from the southeast section of the feature.

Included in the feature fill were nine quartz lithics (trim flakes and shatter), two yellow jasper (chert) trim flakes, a small amount of bone, 352 g of fire-cracked rock, some noncarbonized seeds, and one tiny shell-tempered sherd.

The feature was located in the eastern portion of a 4.5 m x 6 m block of eight 1.5 m x 1.5 m excavation units. Artifacts from the block indicate the presence of three components: Late Archaic small stemmed, Middle Woodland (Kipp Island-like), and Late Woodland. The artifacts include three Levanna triangles, eight Jack's Reef corner-notched points, and three Squibnocket triangles. Six of the eight Jack's Reefs are yellow jasper, and jasper makes up about 4% of the 1917 lithics from the block.

Childs (Chapter 14) recognizes five vessel lots from the block, and additional sherds come from the area as well. This pottery shows a variety of Middle Woodland attributes, including several decorative techniques (incising, scallop shell impressions, and punctations) in triangle-based motifs. The ceramics are probably associated with the Jack's Reef points. Virtually all of the artifacts were recovered from the plowzone.

The two jasper flakes from Feature 01 suggest that the pit fill was deposited during the Middle Woodland component. The color and texture of these two flakes fall within the range of material represented by the six jasper Jack's Reef points. The tiny shell-tempered sherd from the feature also supports the assignment of the feature to this component. Although it has not been placed in a vessel lot, the sherd is shell tempered, like the majority of ceramics from the block, most of which Childs believes to be Middle Woodland.

The two radiocarbon dates are consistent with late Middle Woodland components from other Northeastern sites. The dates themselves present a difference of over 300 years. Relative to the precision of the measurements, this difference is great enough to indicate that the dates may not represent the same true age. Soil characteristics do not indicate multiple episodes of deposition within the feature. The relatively intact condition of the fragile _Mya arenaria_ shells from the upper layer argues against the redeposition of older shell on top of the lower, younger dating layer. One possibility is that shell dates from Nauset are systematically shifted several centuries older than their true ages.

Provenience: 22-00-020 _Concentration_: 274/339.12

Age (Lab No.): 1285 ± 120 BP (GX-9552) (δ C-13= -0.6 o/oo)

Material: 103.71 g _Mercenaria mercenaria_ shell fragments

Source: General excavation

Context and Associations: Level 020, extending from 20 cm to 30 cm BS, is the lowest level within the plowzone in Excavation Unit 22. Abundant fire-cracked rock and patches of fire-reddened soil, both concentrated in the western half of the excavation unit, marked a probable plow-disturbed hearth in this level. Shell abundances increased dramatically in this level, as compared to higher plowzone levels, and the excavator noted that roughly 80% of the shell came from the western half of the unit. Since these anomalies were amorphous and clearly within the plowzone, a distinct feature could not be isolated in the ground. Thus, the excavator treated this as a regular excavation level and screened all soil. Sample GX-9552 is a subsample of the

Mercenaria shell collected in the .25 inchscreen from the entire area of the unit in Level 020.

Excavation Unit 22 is on the west side of a 4.5 m x 6 m block of eight 1.5 m x 1.5 m excavation units. The previous discussion of the radiocarbon samples from Feature 01 provides a general overview of the material recovered from the block. Four Jack's Reef points and one possible Meadowood cache blade come from this level in Excavation Unit 22, and most were recovered in the east half of the unit. Jasper lithics comprise 8.6% of the 176 lithics from the level. Ceramics, especially sherds from vessel 5, a shell tempered pot with dentate and incised decorations, are also abundant in this level.

Although the context is plow-disturbed, the abundance of Jack's Reef artifacts made radiocarbon dating appropriate. The high frequencies of lithics, shell, and ceramics argued that the archeological phenomena in Level 020 still had a limited amount of integrity. However, plowing has disrupted the feature and has perhaps mixed shell from earlier or later components with shell from the Middle Woodland period.

The radiocarbon date of 1285 ± 120 BP is consistent with other late Middle Woodland components in the Northeast. The relationship of this age determination to the two from Feature 01 in Excavation Units 16 and 21 is unclear. On statistical grounds, the date from Excavation Unit 22 represents the same true age as the date on charcoal of 1265 ± 130 BP from the feature in the eastern part of the block. However, if a systematic error exists among shell dates from Nauset, then the assay from Excavation Unit 22 would be later by several hundred years than the other two dates from the site. Without a fuller understanding of the Nauset shell dates, complete interpretation of the sample from Excavation Unit 22 is difficult.

19BN341 Dates (Figure 8.3)

Provenience: 23-00-030 Concentration: 341.21

Age (Lab No.): 1000 ± 145 BP (GX-9561) (δ C-13= -0.7 o/oo)

Material: 101.3 g *Mercenaria mercenaria* shell fragments

Source: General excavation

Age (Lab No.): 1375 ± 155 BP (GX-9562) (δ C-13= -0.1 o/oo)

Material: 104.3 g *Mercenaria mercenaria* shell fragments

Source: General excavation

Context and Associations: Level 030 was a 1 cm to 5 cm thick lens of shell beneath the plowzone. Beneath the shell layer was a thin (about 5 cm thick) mottled zone, transitional to the B2 horizon. The zone was very dark brown (10YR2/2) with abundant mottles of dark yellowish brown (10YR4/6) B2 horizon soil. The subplowzone midden extended beyond Excavation Unit 23, occurring in portions of the adjacent units 17 and 22. In each of these units, shell abundance increased with depth in the plowzone, so plowing had apparently disturbed the upper portion of the shell deposit. Samples GX-9561 and GX-9562 are both subsamples of shell collected from .25 in mesh excavation screen.

Level 030 produced one Levanna triangle and a second thick triangular biface, which may be an unfinished Levanna. Both shell-tempered and grit-tempered sherds were found in this level, representing at least five vessel lots (one grit-tempered, four shell-tempered). Childs (in Chapter 14) treats shell-tempered vessels as Late Woodland, and says the grit-tempered vessel may be earlier. Bone fragments were abundant in the shell lens, and these included species of terrestrial and marine mammals, birds, fish, and reptiles.

From the plowzone above the shell lens in Excavation Unit 23 and from the adjacent units came four additional Levanna triangles and four Squibnocket triangles, indicating the presence of both Late Woodland and Late Archaic components. Ceramics are similar to those from Level 030.

The two radiocarbon determinations show a surprisingly large difference, considering that both are subsamples from a single context.

Provenience: 13-03-031 Concentration: 341.23

Age (Lab No.): 1075 ± 110 BP (GX-9556) (δ C-13= +0.2 o/oo)

Material: 44 g *Mercenaria mercenaria* shell fragments

Source: Water flotation

Context and Associations: Feature 03 in Excavation Unit 13 was an amorphous lens of shell at the base of the plowzone. The feature was small, measuring 23 cm by more than 12 cm (it extended into the north wall of the excavation unit). The fill was very dark gray (10YR3/1) silty fine-medium sand, with shell fragments. The feature extended a maximum of 12 cm into the B2 horizon. Interpretation of the feature is problematic. It may have been the base of a shallow pit, a chamber in an animal burrow, or the lowest portion of a midden the remainder of which was disturbed by plowing. Flotation of feature fill produced only flakes, shell, noncarbonized seeds, and a miniscule amount of charcoal. Sample GX-9556 is virtually all the shell obtained by flotation from this feature.

Excavation Unit 13 and the adjacent unit 18 produced one Squibnocket stemmed point, two Susquehanna broad/Wayland notched points, one possible Lagoon, and five Levannas. Ceramics included three shell-tempered vessel lots, one grit-tempered lot, and one mixed-temper lot. None of these artifacts were directly associated with Feature 03.

The date of 1075 ± 110 BP probably refers to the Late Woodland component, but it falls close to the boundary between the Middle and Late Woodland periods. It is statistically contemporary with the age of 1110 ± 150 BP obtained on shell from the nearby Feature 04, which also is in Excavation Unit 13.

Provenience: 13-04-031 Concentration: 341.23

Age (Lab No.): 1110 ± 150 BP (GX-9557) (δC-13= 0.0 o/oo)

Material: 20.2 g *Mercenaria mercenaria* shells

Source: Water flotation

Context and Associations: Feature 04 was a thin (2 cm thick) amorphous lens of shell at the base of the plowzone. The lens spanned about 37 cm along the excavation unit's west wall and had a maximum width of about 12 cm. It extended slightly into the mottled B2 horizon. The fill closely resembled that of Feature 03 in the same eExcavation unit-- a very dark gray (10YR3/1) silty fine-medium sand with shell fragments. Like Feature 03, this deposit is difficult to interpret. It may have been prehistoric (e.g., the base of a small pit or an undisturbed lens of midden) or not (e.g., a product of plowing or animal burrowing). Flotation of feature fill produced a few flakes, shell and noncarbonized seeds. Twenty-two sherds (total weight 75.6 g) of the grit-tempered rocker dentate ceramic vessel lot 5 (see Capter 14) were directly associated with this feature.

Material from the area adjacent to the feature was enumerated above in the description of the nearby Feature 03.

The associated artifacts suggest that the date of 1110 ± 150 BP relates to the Late Woodland component. However, given the poor understanding of the depositional context for this feature, the association between vessel lot 5 and this date may be merely fortuitous. The date is statistically contemporaneous with the date of 1075 ± 110 BP obtained on shell from the nearby Feature 03.

Provenience: 12-01-035 Concentration: 341.24

Age (Lab No.): 970 ± 120 BP (GX-9555) (δ C-13= +1.3 o/oo)

Material: 54.6 g *Mercenaria mercenaria* and 7.9 g *Mya arenaria* shell fragments

Source: General excavation

Context and Associations: Feature 01 in Excavation Unit 12 was a small, poorly defined pit largely destroyed by plowing. Excavators suspected the existence of the feature in the plowzone of the adjacent Excavation Unit 1 because of anomalous soil drying patterns and a high abundance of small bone fragments and small flakes. The base of the feature extended into the B2 horizon in adjacent Excavation Unit 12, and only this lowest, intact portion of the pit was excavated as a feature provenience. Feature fill consisted of dark brown fine sand with abundant bone and shell fragments. No soil was floated from this feature. (The survey had not yet adopted a flotation technique when this feature was excavated.) GX-9555 comprises all *Mercenaria* and *Mya* shell from 12-01-035.

A sherd from vessel lot 13 (Childs in Chapter 14), a cordmarked shell-tempered pot, occurred in 12-01-035. (The vessel lot is spread throughout Concentration 341.24.) The base of the feature (12-01-040) produced a Levanna point.

The contiguous group of four 50 cm by 50 cm excavation units (EU's 1, 10, 11, and 12) has four 1.5 m squares (EU's 15, 19, 20, and 21) adjoining it or nearby. From non-feature contexts in this block of excavation units came 13 fragmentary and whole Levanna triangles and three Squibnocket triangles. This area also provided twelve ceramic vessel lots (two grit-, two mixed-, and eight shell-tempered).

The date of 970 ± 120 BP is consistent with the directly associated Late Woodland artifacts from the feature.

Provenience: 15-01-036,
15-01-046, and
15-01-056
Concentration: 341.24

Age (Lab No.): 890 ± 150 BP (GX-9558)

Material: 3.39 g wood charcoal (species not identified)

Source: Water flotation

Age (Lab No.): 1090 ± 155 BP (GX-9559) (δ C-13= -0.1 o/oo)

Material: 75.63 g *Mercenaria mercenaria* shell fragments

Source: Water flotation

Context and Associations: Feature 01 in Excavation Unit 15 was a small U-shaped pit, roughly circular in plan, measuring about 31 cm in diameter. The upper portion of the feature and the undisturbed portion were truncated by plowing. First recognized at the base of the plowzone, the feature was 42 cm deep to the bottom of the pit. Fill was black (5YR2.5/1) silty fine-medium sand with some shell and a few fire-cracked rocks.

Sample GX-9558 comes from five feature proveniences: 15-01-036 (S section), -036 (N), -046 (S), -046 (N), and -056 (S). Sample GX-9559 comes from two feature proveniences: 15-01-036 (S section) and -036 (N). Combination in each case was required to produce a sample of suitable size for dating.

Flotation of the Feature 01 fill produced some flakes, carbonized seeds and nuts, and faunal material, including 124 g fish bone (species not identified), as well as small quantities of bird and mammal bone. The feature produced 27 shell-tempered sherds (total weight 1.8 g), including 10 from vessel lot 15, a shell-tempered, cord-marked pot. The feature was first identified at the beginning of Level 024, but 8 cm of the feature were included in this nonfeature level. Artifacts from this level, some of which may have come from the feature, include three Levannas and one Squibnocket triangle. Material from the general area around the feature is described in the section on the nearby Feature 01 in Excavation Unit 12.

The two dates are consistent with a Late Woodland component as represented by the associated artifacts. The dates overlap within one standard deviation, and consequently can be regarded as representing the same true age. Rippeteau and Long's (1974:208-209) method of averaging yields a mean date of 985 ± 110 BP. Two other pairs of shell and charcoal dates (from 19BN274/339 and 19BN323) have discrepancies of between 300 and 400 years (shell older than charcoal), so this averaging may not be appropriate.

Provenience: 21-02-038 (E section) Concentration: 341.24

Age (Lab No.): 1460 ± 155 BP (GX-9560) (δC-13= +1.2 o/oo)

Material: 59.75 g *Mercenaria mercenaria*, *Mya arenaria*, and unidentified shell fragments

Source: Water flotation

Context and Associations: Feature 02 in Excavation Unit 21 was a small (about 31 cm x 19 cm), irregularly shaped shell lens or truncated pit. It was found in the mottled B horizon and was first recognized as a cluster of artifacts in the northeastern corner of the excavation unit at about 32 cm below datum (these artifacts were included in the provenience numbered 21-00-026). A clear soil discoloration became apparent at 38 cm, and excavators defined the anomaly as a feature at this depth. The feature was 11 cm thick from the point at which a clear discoloration of the soil was apparent to its base. Feature fill was black (7.5YR2/0) silty fine sand. GX-9560 consists of all shell produced by flotation of the east section of Feature 02.

The fill produced, in addition to shell and charcoal, three flakes and two pottery sherds (weight: 1.5 g) belonging to vessel lot 13 (Childs in Chapter 14), a shell-tempered cord-marked pot. Level 026, which may include some feature material, included a variety of sherds, including grit-, shell-, and mixed-tempered.

The material from the general area around the feature is described above in the section on the nearby Feature 01 in Excavation Unit 12.

The date from Feature 02 of 1460 ± 155 BP appears to be rather old for the Late Woodland component in Concentration 341.24 and might reflect an unrecognized Middle Woodland component. The assay is also anomalous because it is associated with Vessel Lot 13. This vessel lot occurred in Feature 01 of Excavation Unit 12, which produced a date of 970 ± 120 BP. The two dates clearly represent two different true ages.

19BN390 Dates (Figure 8.4)

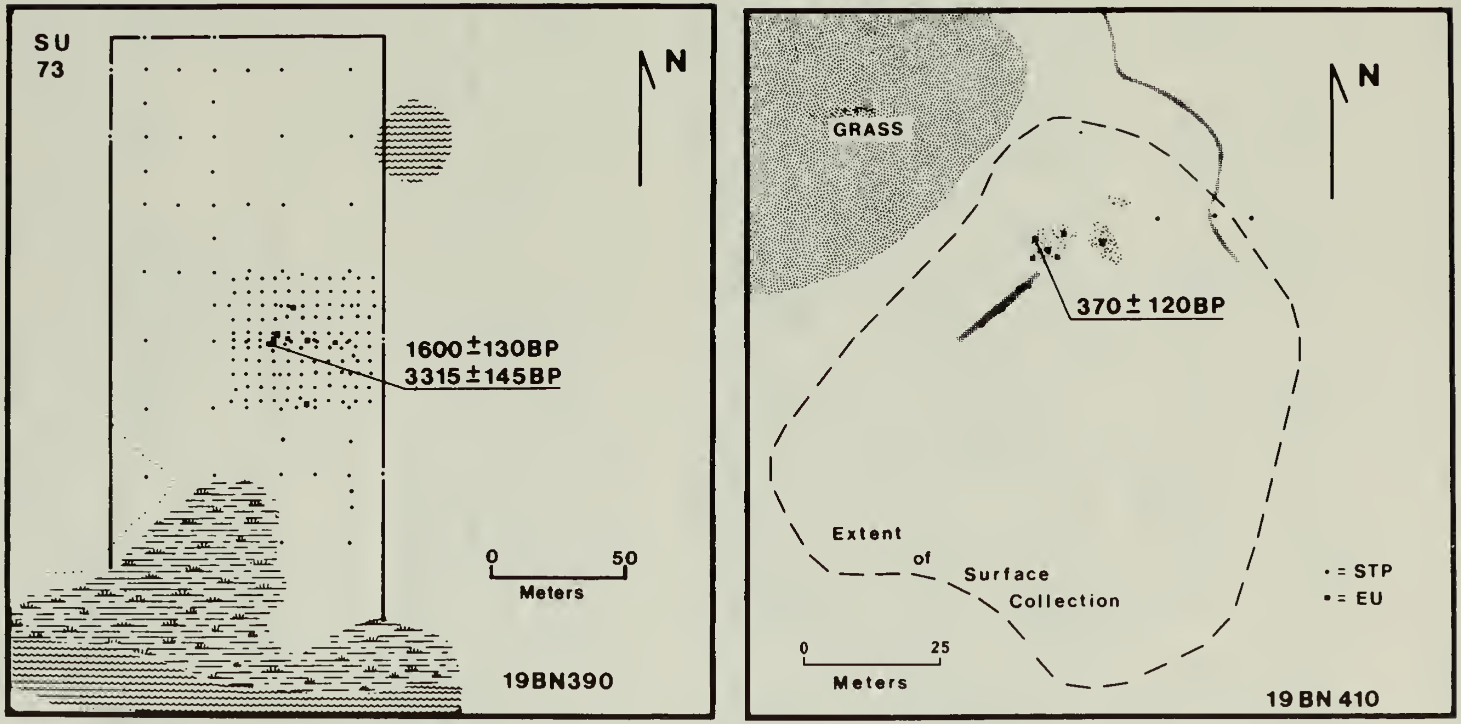
Provenience: 9-01-081 (NE section)   Concentration: 390.33

Age (Lab No.): 1600 ± 130 BP (GX-9705)

Material: 8.05 g wood charcoal (species not identified)

Source: Water flotation and sample collected for radiocarbon dating

Context and Associations: Feature 01 was a large lens of unburned shell in the southeastern part of Excavation Unit 9. The feature was at the base of the plowzone and extended beyond the edge of the excavation unit. Fill consisted of dense shell--mostly Mercenaria mercenaria-- in a matrix of dark gray to black soil. The feature graded to the west into a slightly deeper area where more burned shell was present, and the soil was clayey (ashy?) with a brown color. Excavators designated this area as a


SU
73
N
1600±130BP
3315±145BP
0
50
Meters
19BN390
N
GRASS
370±120BP
Extent
of
Surface
Collection
0
25
Meters
· = STP
• = EU
19 BN 410

Radiocarbon Dates at 19BN390 & 19BN410

FIGURE 8.4

separate feature, 02. Subsequent examination of features 01 and 02 showed that these two were simply facies of a single deposit. Together these features covered a maximum area of about 60 cm by 140 cm and had a maximum thickness of 18 cm. They were irregular in plan view.

GX-9705 is from a roughly triangular section of Feature 9-01 (measuring 52 cm by 26 cm) along the east wall of the excavation unit. This excavation area extended from 81 cm below unit datum to 86-91 cm. Charcoal from flotation was combined with material collected specifically for dating to produce a sample of suitable size. The source of the sample was clearly below the interface of disturbance created by plowing.

Feature 01 produced shell, flakes, bone, charcoal, and fire-cracked rock. Sherds of vessel lots 10 and 11, mixed-tempered undecorated and grit-tempered with punctations, respectively, came from 09-01-081. Flotation residue is incompletely analyzed. The stratigraphy in the block that includes Excavation Units 3, 6, 8, and 9 is poorly understood. The block produced one Susquehanna broadpoint, one biface with broadspear technological attributes, one Squibnocket stemmed and one Rossville; none of these are from Excavation Unit 9. The percentage of quartz for the concentration as a whole (21.2% of 306 lithics) is high. Pottery included nine vessel lots: four grit-tempered, three shell-tempered, and two mixed grit and shell. Two beads of rolled copper came from Excavation Unit 6, adjacent to Unit 9.

The radiocarbon date of 1600 ± 130 BP is consistent with the associated Middle Woodland ceramics. It is statistically contemporaneous with a date of 1550 ± 80 BP (Y-1553) on Stratum 3 of the Cunningham site on Martha's Vineyard (Ritchie 1969b: 97, 122). As Childs notes in Chapter 14, the ceramic assemblage from this portion of 19BN390 strongly resembles the ceramic assemblage from Stratum 3 at Cunningham.

Provenience: 9-03-107 (N&S section) Concentration: 390.33

Age (Lab No.): 3315 ± 145 BP (GX-9706)

Material: 5.28 g wood charcoal (species not identified)

Source: Water flotation and sample collected for radiocarbon dating

Context and Associations: Feature 03 in Excavation Unit 9 was a hearth beneath Features 01 and 02 in that unit. Excavators first noticed fire-cracked rock in abundance around 100 cm below unit datum, but the feature was not clearly defined until 107 cm.

At this depth the feature was oval; it extended to 115 cm and was flat-bottomed in cross-section. Soil in the feature was dark brown (10YR3/3) fine-medium sand. Surrounding the feature was a broad area of yellowish red (5YR4/6) soil.

GX-9706 was all charcoal recovered from the feature fill between 107 cm and 115 cm. Samples from several proveniences had to be combined to create a sample of sufficient size for dating.

The fire-cracked rock included 6800 g directly associated with Feature 03 and 12,094 g from the area immediately above. Most of this latter is probably also from the feature. Little else was in the fill: 14 flakes, some charcoal, and some bone fragments. No pottery came from the feature. The section above on the radiocarbon date from Feature 01 summarizes the material from the surroundng area. Abundant fire-cracked rock and patches of yellowish red soil were scattered in the adjacent Excavation Unit 6 at about the same stratigraphic position as Feature 03 in Excavation Unit 9. Presumably the rock and soil are related to the feature.

The radiocarbon date seems to relate to a Late Archaic component, but no artifacts were directly associated with it. The date also indicates that the hearth is not contemporary with the overlying Features 01 and 02, the latter of which has an age of 1600 ± 130 BP.

19BN410 Dates

Provenience: 3-01-009 Concentration: None

Age (Lab No.): 370 ± 120 BP (GX-9707)

Material: 3.14 g wood charcoal (species not identified)

Source: Taken as radiocarbon sample

Context and associations: Site 19BN410 has a thin discontinuous oyster (*Crassostrea virginica*) shell layer that was deposited on stabilized dune sand. Feature 01 in Excavation Unit 3 was a scatter of burned and unburned wood and a tree root within the shell layer. This material was between 9 cm and 14 cm below the surface, about in the middle of the 25 cm thick midden. The feature was mostly in the eastern half of the 50 cm by 50 cm unit. The tree root may have been intrusive, but the scattered burned and unburned wood fragments appeared to be *in situ*. Of all of the woody material in the excavation unit, the location of sample GX-9707 suggested that it was the least likely to be intrusive.

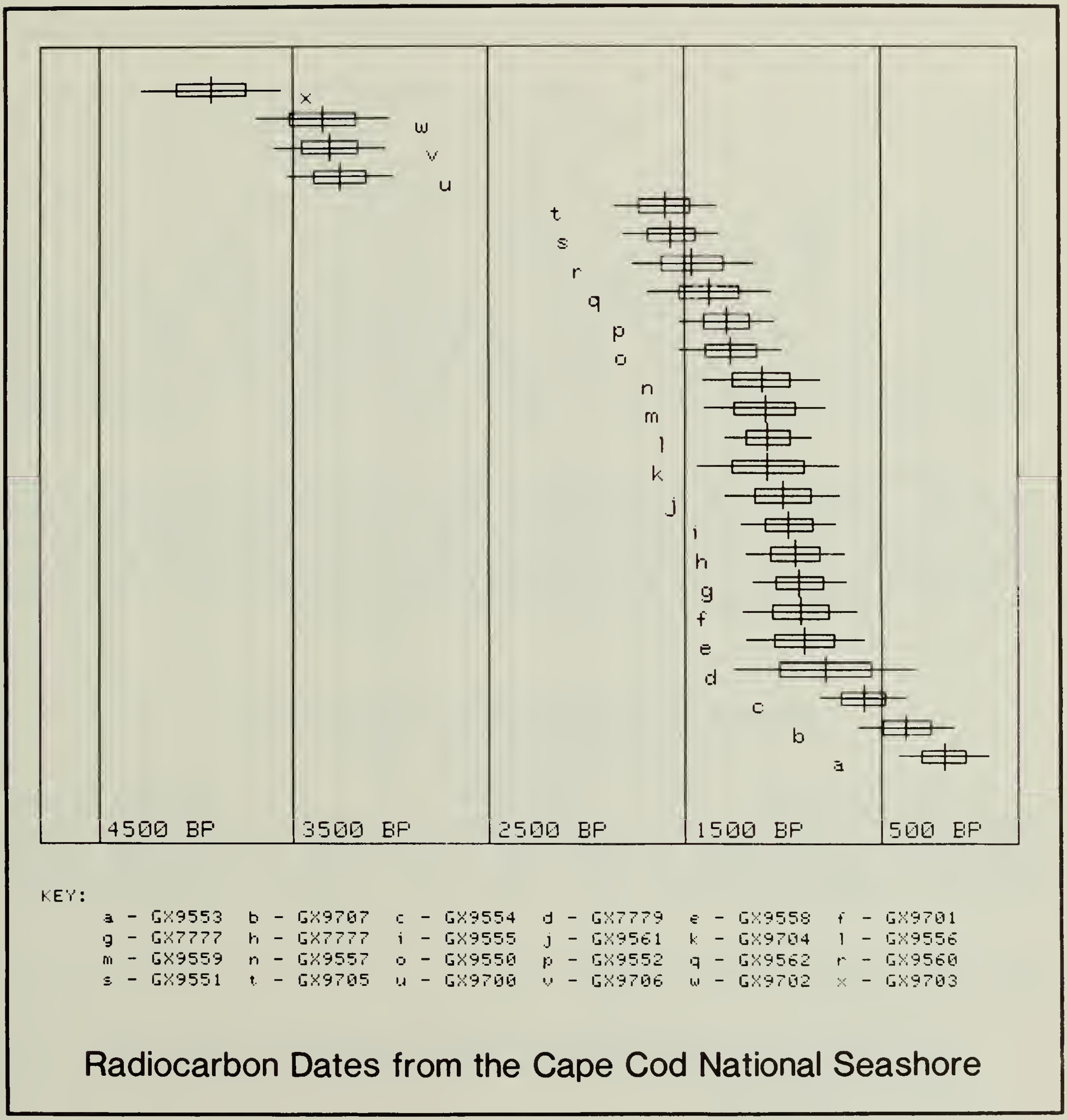
The sample is associated with shell and bone fragments. The shell layer produced very few flakes or pottery sherds. Numerous lithics, including three Levanna points, and many fire-cracked rocks were collected from the deflated surface surrounding the midden. These artifacts on the surface are presumed to be contemporaneous with the shell layer.

The assay provides a plausible terminal Late Woodland date, and the recovered artifacts do not contradict this age. Since the site produced no indications of a Contact period occupation, there is a possibility that the dated material is intrusive. A second assay on shell is planned to confirm the date.

Radiocarbon Dates: Discussion

The 24 radiocarbon dates from the Seashore sites form two major clusters (Figure 8.5). An early group of four dates falls into the fourth millenium before present. The remainder of the dates comprise a group that begins about 1600 BP and extends to the recent past. The two groups are separated by a gap of roughly a millenium and a half, which provides no dates. These clusters, in a general way, follow the pattern of artifact abundance through time. The earliest period represented by a high frequency of artifacts is the Late Archaic. The first half of the Woodland period, corresponding to the segment of prehistory not presently represented by any dates, is marked by a dearth of artifacts. From the late Middle Woodland onwards, artifacts and radiocarbon dates are again numerous. These patterns may reflect periods of higher and lower poulation on the outer Cape or periods of longer or shorter lengths of habitation. On the other hand, these "patterns" may reflect nothing more than the presently limited state of our knowledge of prehistory.

Fifteen of the 24 radiocarbon determinations from the Seashore sites are made on shell. Some archeologists discourage the use of shell for dating, except as a last resort. Ritchie (1969b), for example, in his study of Martha's Vineyard archeology, dated only samples of charcoal, although shell was abundantly available to him. Not using shells as samples for radiocarbon dating seems to be an unnecessarily conservative attitude. With proper pretreatment marine bivalve shells yield generally reliable radiocarbon ages (Michels 1973: 161-162). One common question is whether the radiocarbon in shellfish shells is in equilibrium with the worldwide atmospheric reservoir (Taylor 1978: 49-53). Little work has been done on this question in coastal New England. Stuiver and Borns (1975) found late Pleistocene dates on shell and seaweed to be in good agreement with one another. Sanger (1981: 39) has written that "there is no need for a correction factor when interpreting comparatively recent shell dates from eastern Maine and western New Brunswick;" however, more recent work has suggested to him that shell may



consistently date one to two hundred years older than charcoal (David Sanger, personal communication 1984). On the other hand, Barber (1982:14,16) reports a pair of dates from a single feature at the Wheeler's site in the Merrimack drainage that suggest some correction factor may be necessary in that area. One of Barber's samples is shell and the other is charcoal, and the two samples differ by 490 years. Barber does not comment on this difference.

The radiocarbon dates from the seashore are ambiguous on this question. Of the three pairs of shell and charcoal samples from the same contexts, one pair shows concordance within the precision of the dates. The pair is from 19BN341, Concentration 341.24. The date of 890 ± 150 BP (GX-9558) on charcoal overlaps the date of 1090 ± 155 BP (GX-9559) on shell within one standard deviation. This overlap indicates that the dates can be considered to be contemporary. Two other pairs, one from 19BN274/339 (1265 ± 130 (GX-9550) on charcoal and 1570 ± 120 BP (GX-9551) on shell) and the other from 19BN323 (180 ± 115 BP (GX-9553) on charcoal and 590 ± 110 BP (GX-9554) on shell) do not overlap within one sigma. The lack of overlap indicates that the difference in age is greater than that caused by measurement uncertainties alone.

Thus, at present the question of a systematic shift in dates on shell samples is unresolved. All that can be concluded from the data is that shell dates from the outer Cape _may_ produce dates that are systematically several hundred years too old. More shell-charcoal pairs are needed, from the Seashore and from adjacent coastal areas, to resolve the question.

Summary of Chronological Information

The following are summaries of the chronological interpretations for each concentration. Table 8.5 gives the meanings for the abbreviations used at the beginning of each site summary. Question marks are used to indicate uncertain or tentative designations.

Fort Hill 19BN308 (Foldout Map D)

No components identified: Concentrations 308.12, .13, .15, .16, .23, .25, .26, .27, .32, .35, .52, .61

Single component:
- Middle-Late Woodland: Concentrations 308.71, .72
- Late Woodland: Concentrations 308.11, .21, .22, .24, .31, .34 (sc?)

TABLE 8.5

Abbreviations Used in Site Summaries

MA = Middle Archaic

LA = Late Archaic

l = Laurentian tradition

ss = Small stemmed point tradition

b = Susquehanna tradition

EW = Early Woodland

MW = Middle Woodland

LW = Late Woodland

sc = single component

mc = multicomponent

- = to

/ = or

? indicates uncertainty
about the interpretation

Multicomponent: Concentration 308.14 (MW, LW), .33 (LA?, MW, LW), .41 (LAss, LA/EW?, MW-LW), .42 (LA?, MW?, LW), .43 (LAss, MW-LW), .51 (LAss, MW-LW)

Radiocarbon Dates:
Concentration .00: 3925 ± 180 BP (GX-9703)
Concentration .33: 910 ± 145 BP (GX-9701)
Concentration .42: 3350 ± 170 BP (GX-9702)
Concentration .51: 3260 ± 135 BP (GX-9700)
1075 ± 150 BP (GX-9704)

Comments: Late Woodland represented by ceramics alone in Concentration 308.21, .22, .31, and .34 and by a projectile point alone in Concentration .24. Limited ceramic evidence suggests Middle-Late Woodland component in Concentration .71 and .72. A relatively high percentage of weathered felsics in Concentration .34 (7.7% of 636 lithics) hints that an earlier component, in addition to Late Woodland, may also be present. In Concentration .41 the presence of a Late Archaic-Early Woodland component is uncertain because classification of a point as an Orient fishtail is only tentative. Eight chert flakes (1.2% of 691 lithics) suggest the possibility of a Middle Woodland component in Concentration .42; ceramics are Middle-Late Woodland, and two Late Woodland Levannas occur in this concentration. Lithic materials (7.9% of 267 lithics are chert) and a Jack's Reef corner-notched point (reworked as scraper) suggest a Middle Woodland component in Concentration .43; presence of a Late Woodland component in this concentration is uncertain because identification of Late Woodland affiliation of ceramics is uncertain. Three radiocarbon dates are concordant with Late Archaic occupations, and two probably refer to Late Woodland components. The date of 3925 ± 180 BP from auger hole 802 indicates that Archaic components are buried beneath the salt marsh in at least one place at the site.

Fort Hill, 19BN323 (Foldout Map D)

No components identified: Concentrations .11, .12, .13, .14, .15

Single component:
Late Woodland: Concentrations .22, .23, .24

Multicomponent: Concentrations .21 (LAb, EW, MW?, LW)

Radiocarbon Dates:
Concentration .22: 180 ± 115 BP (GX-9553)
590 ± 110 BP (GX-9554)

Comments: Late Woodland represented by projectile points in Concentrations .21-.24, and Middle-Late Woodland indicated by ceramics for Concentration .22. Concentration .22 also produced a point tentatively identified as a Rossville, indicating a possible Early Woodland component. Chert percentages are slightly more than 1% (5 of 488 lithics). This is evidence of a possible Middle Woodland component in Concentration 22. Radiocarbon dates are problematic.

Fort Hill, Summary

The Late Woodland appears to be the period of the most extensive activity in the Fort Hill area. All 18 concentrations with identified components have evidence of Late Woodland or Middle-Late Woodland occupations, and in nine of these concentrations this late period is the only identified component. Evidence of Late Woodland occupations is thus widely distributed along the southern and eastern flanks of the hill and to the north at 19BN323. Much of the recovered shell and debitage and many of the implements probably were deposited during the Late Woodland period, but plowing has obliterated stratification almost everywhere. Undisturbed stratified shell deposits occur beneath plowzone or fill in 308.33, .42, and .71. Unfortunately, few diagnostic artifacts have been recovered from these areas. Radiocarbon dates may provide some evidence to place some of the concentrations in temporal order within the Late Woodland period. Site 19BN308 has two radiocarbon dates of around 1000 BP that probably refer to a Late Woodland component. Both dates are on shell fragments. The date of 910 ± 145 BP comes from the uppermost level of intact general midden in Excavation Unit 300 (308.33); levels beneath produced fragments of three Levanna points. The date of 1075 ± 1580 BP in Excavation Unit 202 (308.51) comes from the lowest level of plowzone in Excavation Unit 202; this date appears to be much later than the Squibnocket triangles from the same level. Two radiocarbon dates from a sub-plowzone shell deposit at 323.22 Excavation Unit 20 are problematic because of the large difference between them. The date of 590 ± 110 BP (on _M. mercenaria_ shells), if accurate, reflects the Late Woodland component in this concentration, and is consistent with the indirectly associated artifacts. If this date is accurate, it also indicates the shell lens in 323.22 is younger than the material dated at 19BN308. A second date from the same context of 180 ± 115 BP (on carbonized wood) indicates disturbance, contamination, or post-contact re-deposition of the shell lens.

Scattered indications of one or more Middle Woodland components occur around Fort Hill. These take the form of projectile points (one each: Rossville?, Fox Creek stemmed and lanceolate, and Jack's Reef corner-notched), relatively high percentages of chert lithics, and some pottery with Middle Woodland ceramic attributes. Based on present evidence, Middle Woodland occupations were neither extensive nor intensive.

Late Archaic occupations at Fort Hill are represented by single occurrences of Orient fishtail (?) and Susquehanna/Wayland points and by small stemmed components. All Late Archaic artifacts are in mixed congeries with later material. The three concentrations with small stemmed point components all occur in the southern portion of the Fort Hill area. The evidence for small stemmed point occupations in 308.41 and .43 consists largely of the relatively high quartz percentages (one Squibnocket triangle also occurs). In Concentration 308.51, evidence is more extensive and includes relatively high quartz and weathered felsic percentages (11.8% and 16.4%, respectively, of 1125 lithics). Concentrations .41 and .43 are located at the base of the hill within and adjacent to a low marshy area, while Concentration 51 is on broad level terrain near the edge of the salt marsh. Three radiocarbon ages at 19BN308 refer to the Late Archaic period. All are from shell middens, and all are on shell. The oldest is a date of 3925 ± 180 BP from a man-made shell deposit beneath salt marsh sediments (auger 802). Two others are younger, dating to about 3300 BP. These two dates are contemporaneous within the precision of the measurements. A date of 3350 ± 170 BP comes from the lowest level in the shell midden in Excavation Unit 300 in Concentration 308.33. Feature 06 in Excavation Unit 107 (308.42) produced a date of 3260 ± 135 BP; 45% (of 31) flakes from this deposit were quartz.

Southern Side of Salt Pond, 19BN340 (Foldout Map E)

No components identified: Concentrations .11, .12, .13, .21, .22

Comments: Total lithics for all concentrations is only 137, of which 16% (22) are quartz. A Late Archaic small stemmed component probably occurs at 19BN340, but this cannot be attributed to any specific concentration because of the small assemblage size. One Squibnocket triangle from EU 3 (Concentration .00), located between Concentrations .13 and .21, supports the presence of a small stemmed component. Since only 16% of the lithics are quartz, one or more other, unidentified, components are also present at the site.

Southern Side of Salt Pond, 19BN274/339 (Foldout Map E)

No components identified: Concentrations .21, .31, .32, .41

Single component (?):
Late Archaic small stemmed: Concentrations .11, .22

Multicomponent: Concentrations .12 (LAl, ss, MW, LW), .13 (LAss, MW)

Radiocarbon Dates:
Concentration .12: 1265 ± 130 BP (GX-9550)
1570 ± 120 BP (GX-9551)
1285 ± 120 BP (GX-9552)

Comments: Late Woodland identified in Concentration .12 primarily because of three Levannas. Majority of lithic materials on site are quartzite or felsic volcanics (not quartz or chert), suggesting that Late Woodland may be more extensive on site as a whole than indicated by diagnostic materials.

The block of excavation units in the center of Concentration .12 produced a prominent Middle Woodland component. The assemblage includes eight Jack's Reef Corner-Notched points (six yellow jasper, one black chert, and one hornfels) and three yellow jasper bifaces. Overall, 82 (of 1917: 4.3%) lithics from the block of EU's are jasper. Ceramics from this block show a variety of Middle Woodland attributes and are similar to Middle Woodland ceramics from Martha's Vineyard. The three radiocarbon dates for Concentration 274.12 may refer to this component, but the 305 year difference between GX-9550 and GX-9551, two samples from the same feature, has not been explained. Four chert (of 133) lithics in Concentration 274.13 indicate that the Middle Woodland component probably extends into that concentration as well.

Late Archaic small stemmed components are indicated by Squibnocket triangles in Concentrations .11 and .12 and by a Poplar Island point in Concentration .22. High quartz percentages in Concentrations .12, .13 and .22 (18% of 2139, 18.8% of 133, and 50% of 212, respectively) also indicate the presence of small stemmed occupations. The total percentage of quartz for all concentrations is 21% (of 2599).

An Otter Creek side-notched point in Concentration .12 suggests the presence of a Laurentian component.

Southern Side of Salt Pond, 19BN273/275 (Foldout Map E)

No components identified: Concentrations .12, .13, .21, .31, .32

Single component(?):
Late Archaic small stemmed: Concentration .11

Comments: Assemblage from site is small. Late Archaic small stemmed component in Concentration .11 indicated by a small stemmed point. Small scraps of ceramic sherds in Excavation Units 3, 4, and 5 indicate Woodland occupations in Concentration .31 and .32, but no components can be specified. The total percentage of quartz for all concentrations is 7.7% (of 388).

Southern Side of Salt Pond, 19BN341 (Foldout Map E)

No components identified: Concentrations .11, .25, .26, .27

Single component(?):

Late Woodland: Concentrations .22

Multicomponent: Concentrations .21(LAss, W?, MW?, LW), .23(LAss,b,EW?,LW), .24(LAss, MW?, LW)

Radiocarbon Dates:

Concentration .21: 1000 ± 145 BP (GX-9561)
1375 ± 155 BP (GX-9562)
Concentration .23: 1075 ± 110 BP (GX-9556)
1110 ± 150 BP (GX-9557)
Concentration .24: 970 ± 120 BP (GX-9555)
890 ± 150 BP (GX-9558)
1090 ± 155 BP (GX-9559)
1460 ± 155 BP (GX-9560)

Comments: Late Woodland is indicated by Levanna projectile points alone in Concentrations .22 and .24 and by ceramics and points in Concentrations .21 and .23. Numerous Levannas and fragments were recovered from Concentrations .21, .23, and .24. Components other than Late Woodland may also be present in Concentration .22, based upon multicomponent character of adjacent Concentrations .21, .23, and .24. (Concentration .22 received less testing than these others.) The radiocarbon dates appear to refer primarily to the Late Woodland occupations.

Two dates, 1375 ± 155 BP and 1460 ± 155 BP (Concentration .21 and .24, respectively) are early enough, even considering their precision, to refer to a Middle Woodland component. At present, grit-tempered pottery from both concentrations may also indicate a Middle Woodland component, but evidence is equivocal.

A possible Lagoon point in Concentration .23 and the occurrence of possible Early Woodland grit-tempered ceramics in Concentrations .21 and .23 suggest an Early Woodland component in these concentrations.

Two Susquehanna broad/Wayland notched points from Excavation Unit 13 in Concentration .23 provide evidence of a Late Archaic Susquehanna tradition component in that concentration.

Squibnocket triangles in Concentrations .21 and .24 and a Squibnocket stemmed point in Concentration .23 demonstrate the presence of small stemmed tradition components in these concentrations. The percentage of quartz is also relatively high (11.2% of 2717 lithics) in Concentration .21, but is below 10% in Concentrations .22, .23, and .24. The total percentage of quartz for all concentrations is 8.2% (of 10515).

Southern Side of Salt Pond, Summary

Scattered sherds of well-made shell-tempered pottery suggest a wide distribution of Late Woodland materials in the South Salt Pond area. Only in Concentrations 274.12 and 341.21-.24 is the evidence sufficient to confirm the presence of Late Woodland components. The survey has given these two areas the most extensive testing, so the apparent clustering of Late Woodland components in parts of 19BN274/339 and 19BN341 may be largely a product of the testing strategy.

At least six of the eight radiocarbon dates from 19BN341 probably refer to the Late Woodland occupancy of the site. The oldest two dates in the series from 19BN341 may provide evidence of a Middle Woodland component at the site. Some ceramics from the site may also refer to this earlier component. Interpretation of the dates is made more difficult because nearly all are dates on shell. Limited evidence from several Nauset sites suggests shell may produce dates that are consistently several hundred years older than the samples´ true ages.

A small portion of concentration 341.21 (EU´s 17, .22, and 23) is the only location of sub-plowzone deposits of any extent in the South Salt Pond area. This shell lens produced three Levannas (two from Excavation Unit 22 and one from Excavation Unit 23) and a Levanna preform (from Excavation Unit 23). Childs (Chapter 14) has suggested that the undisturbed deposits extend below the shell lens, basing her conclusion on the distribution of shell-tempered and grit-tempered sherds. M. mercenaria shells from Excavation Unit 23 provided dates on this deposit of 1000 ± 140 BP and 1375 ± 155 BP.

The Kipp Island-like lithics and pottery in concentration 274.12 are the survey´s best example of a Middle Woodland component. Nine yellow jasper bifaces (including six Jack´s Reef corner-notched points), two non-jasper Jack´s Reef points, and over 70 pieces of jasper debitage were recovered from eight 1.5 x 1.5m Excavation Units in a 4.5 x 6m block. All of the Jack´s Reef points have resharpened blades, and the jasper debitage may be the product of tool curation. The jasper is visually identical to the so-called "mustard-colored Pennsylvania jasper," and the material is almost certainly exotic to the Cape (see Chapter 15). The use of exotic jasper is widespread in the Northeast on sites of this general time period (Ritchie 1969a:253; Feder 1981:196-197; Barber 1982:50-53; Wright 1982:202; Peterson and Power 1983). Several ceramic vessel lots also were recovered from this excavation area, and these show several Middle Woodland attributes, including a variety of decorative techniques (incising, scallop shell impressions, and punctations) and triangle-based motifs. Childs (Chapter 14) sees close similarities between the 19BN274/339 assemblage and the Sstratum 3 ceramics at the Cunningham site on Martha´s Vineyard (Ritchie 1969b:107-11; 122-124).

In addition to these materials, the area also produced Levanna points and Late Archaic points. In the approach used here, the Levannas are taken to indicate a Late Woodland component. They also occur in small numbers at late Middle Woodland sites in the Northeast (Ritchie 1971:31; Funk

1976:282,285, Figure 25), so there is a slight possibility that these specimens are the product of the Middle Woodland component, rather than the hypothesized Late Woodland component at 274.12.

A small plow-truncated pit (Feature 01 in Excavation Units 16 and 23) with shell fill appears to be associated with the Middle Woodland component and the Jack's Reef points, based on the few artifacts found in the pit and on the radiocarbon dates from it. The feature provided two dates of 1265 + 130 BP on charcoal and 1570 + 120 BP on M. mercenaria shells. The approximately 300-year discrepancy between the dates may reflect a systematic error in all the shell dates from the Nauset area, because no evidence of disturbance of the feature was noted during excavation. A zone of high shell abundance in the lowest 10 cm of the plowzone in Excavation Unit 22 (located 1.5 m west of Excavation Unit 16) provided a third date of 1285 + 120 BP (on M. mercenaria shells). This date is about 300 years later than the shell date from the feature in Units 16 and 23, but it is nearly identical to the date on charcoal from that feature. Since the shell from Excavation Unit 22 is from the plowzone, the dated sample may be a mixture of material from different periods. One or more of the dates from 274.12 may not reflect the true age of the Middle Woodland component at the site or the dates may indicate that the component spanned several hundred years. The age range provided by the dates is within that indicated for other Middle Woodland components with similar artifact assemblages in the region. These sites include Cunningham at 1550 + 80 BP (Y-1553: Ritchie 1969b: 122-124) and Tufano at 1250 + 100 BP (Y-1382: Funk 1976:71).

Several Late Archaic components occur in the South Salt Pond area. A single Laurentian tradition Otter Creek point from Excavation Unit 2 in Concentration 274.12 and two Susquehanna broad/Wayland notched points in concentration 341.23 indicate components of limited extent. At this time the assemblages cannot be further enumerated for either of these Late Archaic components.

By contrast to the limited distribution of the Laurentian and Susquehanna tradition materials, the small stemmed point tradition occupations appear to have been widespread across the South Salt Pond area. Small stemmed points or Squibnocket triangles occur in 273.11, 274.11, .12, and .22, 340.00, and 341.21, .23, and .24. A continuous quartz scatter covers the entire area, reaching densities of greater than 10% in 274.12, .13, and .22 and in 341.21. While these are the only concentrations having quartz lithics in excess of 10%, the general quartz scatter suggests a continuous low density small stemmed tradition assemblage covers the area. More extensive testing in this area might indicate areas that were heavily used by small stemmed tradition people.

Northern Side of Nauset Marsh, 19BN288 (Foldout Map E)

No components identified: Concentrations .11, .23, .33, .34, .43, .44, .55, .56, .57, .58, .61, .62

Single Component:
Late Archaic small stemmed: .21(sc?), .32(sc?), .41(sc?), .51(sc?), .63(sc?)
Early Woodland: Concentration .54
Late Woodland: Concentrations .22, .31(sc?), .45?

Multicomponent: Concentrations .42(LAss, LW), .52(LAss, LW), .53(EW?, LW?)

Comments: Late Woodland indicated on the basis of projectile points alone in Concentration .22, on the basis of pottery alone in Concentrations .31, .45, and .53, and on the basis of both pottery and lithic artifacts in Concentrations .42 and .52. A weathered felsic volcanic percentage of 6.7% (of 524 lithics) suggests the presence of an earlier component in addition to the Late Woodland component in Concentration .31. Small numbers of grit-tempered cord-marked(?) and dentate stamped(?) sherds suggest the presence of Early Woodland components in Concentrations .53 and .54 (Childs in Chapter 14). Late Archaic small stemmed manifestations are indicated by occurrences of a Wading River stemmed point in Concentration .21 and a Squibnocket triangle in Concentration .52. Relatvely high quartz percentages show for Concentrations .41 (13.4% of 119 lithics), .42 (10.4% of 228 lithics), .51 (10.2% of 245 lithics),, and .63 (16.4% of 116 lithics). Since the majority of lithics in each of these concentrations is not quartz, other components are probably also present. Chert percentages are high in Concentration .52 (1.8% of 1062 lithics) and may indicate the presence of a third component in this concentration. The precise interpretation of several high percentages of weathered felsic volcanics in Concentration .31, .51, .52, .53, and .55 is also unclear, but these percentages suggest pre-Late Woodland components.

Northern Side of Nauset Marsh, 19BN390 (Foldout Map F)

No components identified: Concentrations .11, .12, .21, .23, .32, .37

Single component(?):
Late Archaic small stemmed: Concentrations .31, .34, .35, .36
Early Woodland(?): Concentration .22

Multicomponent: Concentration .33 (LAss, b, EW-MW, LW)

Radiocarbon Dates:
Concentration .33: 1600 ± 130 BP (GX-9705)
3315 ± 145 BP (GX-9706)

Comments: A possible Lagoon point suggests the presence of an Early Woodland component in Concentration .22. High quartz percentage (18.4% of 87 lithics) indicates that a Late Archaic small stemmed component may also be present in this concentration, but the total number of lithics is less than 100, making a formal designation of this component not possible. High quartz percentages in Concentrations .31 (10.8% of 102), .33 (21.2% of 306), .34 (20.7% of 111), .35 (10.3% of 107), and .36 (12% of 99) connote Late Archaic small stemmed manifestations in these concentrations. Since the majority of lithic materials in Concentrations .31, .33, .34, .35, and .36 is not quartz, other components are also implied. Two Squibnocket stemmed points in Concentration .33 and one Bare Island in Concentration .36 support the hypothesized presence of small stemmed tradition occupations. A Susquehanna broad/Wayland notched point indicates a Susquehanna component in Concentration .33. The Orient fishtail from this concentration implies a Late Archaic component, and a Rossville point, also from Concentration .33, suggests an Early Woodland component. Pottery from Concentration .33 includes both grit- and shell-tempered pottery with rocker dentate, scallop impressions, and cord-wrapped stick decorations. Childs (Chapter 14) uses these ceramics to infer an Early-Middle Woodland component in Concentration .33. A Levanna triangle and small amounts of pottery imply a Late Woodland component in Concentration .33. Concentration .33 produced two radiocarbon dates. The date of 1600 ± 130 BP refers to the Middle Woodland component, while the age of 3315 ± 145 BP dates one of the Late Archaic components.

Northern Side of Nauset Marsh, Summary

No component stands out prominently at 19BN288 or 19BN390. Both sites are large and both include both Late Archaic and Woodland manifestations scattered through a number of concentrations. Late Woodland components are suggested at seven (of 36) concentrations by projectile points, ceramics, or both. Any apparent clustering of these components at these sites seems to be more a product of the pattern of test excavations than a product of actual spatial patterning. Much of the shell and debitage and many of the implements at 19BN288 are probably Late Woodland in origin. Most are in plow-disturbed contexts, so this cannot be said with certainty. One small potentially stratified area of shell midden occurs near the base of the kettle hole around Excavation Unit 1 (Concentration 288.42). Artifacts recovered from this unit suggest that the midden is Late Woodland in age. The deep slopewash that floors the kettle hole is characterized by a low density of shell and lithics. Excavations have not established whether any *in situ* prehistoric deposits occur within or beneath this slopewash.

Lithics and pottery suggest several concentrations have Early Woodland components. Present evidence indicates that these occupations did not leave large amounts of archeological evidence.

As in the South Salt Pond area, relatively high quartz percentages (> 10% of lithic assemblage) are scattered across a number of concentrations at 19BN288 and 19BN390. Occasional small stemmed tradition points in a number of concentrations support the interpretation of a widespread small stemmed manifestation.

The block of four excavation units (Excavation Units 1, 3, 8, and 9) in Concentration 390.33 presents a complex stratigraphic and chronological situation. In addition to the ceramics and projectile points mentioned in the site summary, a number of other artifacts also occur in the block, including a series of cobble-based bifaces and two copper beads that are probably prehistoric. This area appears to include a plowzone that was covered with fill or slopewash. The excavators are not certain whether intact, non-feature deposits occur beneath the buried AP-horizon. Components in this concentration include Late Archaic small stemmed, Susquehanna, Early(?)-Middle Woodland, and Late Woodland.

Site 19BN390 has two features with radiocarbon dates. Both are in Concentration 390.33. The younger date of 1600 ± 130 BP is on charcoal from a complex shell lens beneath the plowzone. This feature also produced pottery with decorative and technological attributes of the Early or Middle Woodland period. The date suggests a Middle Woodland age for the ceramics. The second date is on charcoal from a hearth. The date of 3315 ± 145 BP is comfortably within the Late Archaic period, but lack of associated artifacts makes it unclear which component it refers to.

Northern Side of Nauset Marsh 19BN333/6/7 (Foldout Map G)

No components identified: Concentrations 333.11, .12; 336.12, .13; 337.11

Single component (?):
Late Archaic small stemmed: Concentration 336.14

Multicomponent: Concentration 336.11 (LAss, MW, LW)

Comments: Quartz percentages are high in Concentration 336.14 (12.8% of 719 lithics), indicating a Late Archaic small stemmed component. Although weathered felsics are also abundant (11.4% of 719 lithics), quartz is not the majority raw material in this concentration, so one or more other, unidentified components are probably also present. One each Squibnocket triangle, Fox Creek lanceolate, and Levanna triangle show the presence of Late Archaic small stemmed, Middle Woodland, and Late Woodland components in Concentration 336.11.

Summary, 19BN333/6/7

The site cluster to the northeast of 19BN238 and 19BN390, 19BN333/6/7, has an overall low density of artifacts. This infrequency of remains seems partially due to the intense disturbance that accompanied the construction of the Cedar Banks of Nauset golf course in the 1920's (see Chapter 7). The survey has also learned from Eastham residents that the area was long a favored spot for potnunters. The excavated material indicates Late Archaic small stemmed occupations in Concentration 336.14 and small stemmed, Middle Woodland and Late Woodland components in Concentration 336.11.

Coast Guard Beach, 19BN374 (Foldout Map H)

No components identified: Concentrations .22, .23, .31, .32, .41, .42, .47, .52, .53, .55, .56, .57, .61, .63, .71, .81

Single component:
Late Woodland: Concentrations .45, .51, .54
Late Archaic small stemmed: Concentration .62(sc?)

Multicomponent: Concentrations .11 (mc?: LAb?, MW), .21 (Ab, LW), .43 (mc?: MW?, LW), .44 (mc?: MW?, LW), .46 (mc?: MW?, LW?)

Comments: Ceramics and projectile points from the extensive 1982 excavations at Coast Guard have been included for these descriptions, but debitage has not. Levannas present in all concentrations for which Late Woodland is indicated as a component. Small amounts of pottery, designated as late Middle Woodland-Late Woodland (Childs in Chapter 14), present in Concentrations .43, .44, and .46. Uncertainties about the chronological implications of the ceramics leave open the possibility that Middle Woodland occupations occur in these concentrations. A Greene point suggests the presence of a Middle Woodland component in Concentration .11. Several areas provide indications of Archaic occupations. Excavation Unit 7 in Concentration .11 produced a biface suggestive of a Susquehanna tradition Boats blade (Dincauze 1968:26-27). Excavation in Concentration .21 produced two Susquehanna broad/Wayland notched points. A Squibnocket triangle was recovered in Concentration .62. Components other than small stemmed are probably also present in this concentration because quartz is not the majority lithic material. A possible Stark point was found in Excavation Unit 93, an isolated test unit in the northwest quadrant of the site. This possible Middle Archaic find is in an area that has not yet received concentration designations.

Coast Guard Beach, Summary

The site number for the Coast Guard Beach locality, 19BN374, includes areas initially differentiated with six site numbers. Since subsequent investigations have shown that the site is continuous across the whole neck of land at Coast Guard Beach, a single number is here employed for the entire area. Some of the materials from Coast Guard have been the subject of a preliminary report (McManamon and Borstel 1981).

The most widespread component at Coast Guard is Late Woodland, appearing in all but two of the nine concentrations for which components are inferred. Given this abundance of identified Late Woodland materials, much of the debitage and many of the implements in the plowzone are probably also of Late Woodland origin. The character of the Late Woodland activities at Coast Guard is being investigated (Borstel et al. 1983), but only tentative conclusions have been reached. The Middle Woodland and Archaic periods find relatively minor representation at Coast Guard. Unlike many parts of Nauset, the Coast Guard Beach area does not appear to include a widespread small stemmed tradition component. Among the seven concentrations with more than 100 lithics (based on pre-1982 data), quartz percentages range from 1.8% (of 612: Concentration 374.54) to 8% (of 1475: Concentration 374.21), and all but one concentration include 4.3% quartz or less.

Coastal erosion has long been severe at Coast Guard Beach. Erosion has both altered the environmental setting of the site and removed part of the site's prehistoric record. At an average rate of 0.79 m/yr (Zeigler et al. 1964: 408), the beach has retreated about 1600 m in the past two millennia, 300 m of that since A.D. 1600. At 4000 BP the Atlantic Ocean beach was approximately 3 km east of its present position (O'Donnell and Leatherman 1980:8 and Table 2). (Chapter 4 includes a discussion of sea level and erosional changes on the outer Cape.)

These shoreline extensions indicate that any Late Archaic people who wished to use the ocean beach would have found it a couple of kilometers to the east of the present Coast Guard Beach. Four thousand years ago 19BN374 would have been in a setting not unlike the present settings of 19BN288 or 19BN390. The southern edges of these sites are bounded by a scarp, forming the shoreline of Nauset, and the ocean beach is about 2 km away. The Coast Guard locality, however, must have differed in some ways from the Salt Pond area, for sites around Salt Pond seem to show more abundant evidence of Late Archaic small stemmed tradition components than Coast Guard does.

As the shoreline retreated during the Woodland period, Coast Guard would have gradually been shifted into its present setting, directly adjacent to the sea. Later Woodland people who wished to use the ocean beach would have come to a broad neck of land at Coast Guard. This neck would have had a greater area than today, but it would still have been in a setting similar to the present Coast Guard Beach. If these later Woodland people left evidence of their activities close to the ocean cliff, this evidence has since washed away.

Thus, Coast Guard potentially contains the intermixed remnants of two episodes of habitation with two different topographic orientations. The Late Archaic artifacts represent a portion of a site which would have looked out on Nauset Bay, and which would have been a considerable distance from the ocean. The Late Woodland component is the shoreward remnant of a site from which people could have exploited the unique resources of the ocean beach.

Wellfleet Harbor and Herring River Drainage, 19BN387

In September, 1979 the National Park Service supported salvage operations at an ossuary on Indian Neck in Wellfleet (Bradley et al. 1982) (Foldout Map A). Although the feature was not within the seashore, survey archeologists excavated it because construction of a new septic system threatened to destroy it. The ossuary contained unburned bones of at least 47 individuals and the remains of nine cremated individuals. Directly associated with the unburned bone layer is a probable Levanna point (19BN387 artifact catalog notes, Eastern Archeological Field Laboratory, Boston MA). Three additional triangular points come from the shell midden above the feature, and the midden also includes a few small shell-tempered sherds and a fragment of worked European copper (Bradley et al. 1982: 50). These artifacts imply that the ossuary is a Late Woodland period feature. The overlying shell midden seems to be partly Late Woodland and partly Contact period in age. Radiocarbon assays on unburned human long bone fragments from the ossuary produced ages of 935 ± 125 BP (GX-7777-A: bone apatite) and 915 ± 120 BP (GX-7777-G: bone collogen). (The sample numbers in Bradley et al. [1982: 54] are incorrect due to typographical errors). A third date of 785 ± 230 BP (GX-7779) also comes from the site (Frank McManamon, personal communication , 1983). The third sample was small and counting time was short, leading to the large sigma value. It has not been formally reported in print. Bradley and his colleagues note that these dates are "earlier than anticipated," but the characteristics of the ossuary are consistent with other prehistoric ossuaries from Ontario, New York, and the Chesapeake Bay region (Bradley, et al. 1982: 54-57).

Wellfleet Harbor and Herring River Drainage, 19BN434

This site is in a small dry valley that is tributary to the Herring River (Foldout Map I). The assemblage from the site is miniscule (26 lithics in all), and testing produced no diagnostic artifacts. A high proportion of the material from the site is quartz (20 or 77%), suggesting that a Late Archaic small stemmed component may be present. The small assemblage size makes even this notion mere speculation.

Wellfleet Harbor and Herring River Drainage, 19BN471

The site is located close to the former head of tide in the Herring River salt marsh (Portnoy and Soukup 1982:Figure 1). Collectors have long worked at this site, so its overall integrity is poor. Survey excavations produced one Lagoon point, one Rossville point, and one Fox Creek lanceolate point. Quartz constitutes 27.7% of the 3157 excavated lithics. The site thus appears to include both Woodland and Late Archaic components, and this is confirmed by amateur collections from it.

Wellfleet Harbor and Herring River Drainage, Summary

Most of the Herring River was once a large salt marsh that drained into Wellfleet Harbor. Construction of dikes, ditches, and causeways for transportation, development, and mosquito control began in the mid-nineteenth century. Over the past century and a quarter these changes have radically altered the character of the wetland, allowing upland and freshwater plants to invade the former salt marsh (Portnoy and Soukup 1982). Some habitation took place around the wetland, but the harbor shows a much more abundant record.

The eastern shore of Wellfleet Harbor is outside the Seashore boundaries, and construction and collectors have disturbed many of the sites around the harbor. Private collections show that the shores of the harbor were once archeologically rich and reveal a long record of Archaic and Woodland occupancy. Thus, the Indian Neck ossuary appears to be one of many Late Woodland sites surrounding the harbor. Radiocarbon dates on the ossuary place it close to the beginning of the Late Woodland period, but some caution seems appropriate in regard to these assays because they are earlier than expected.

Sites on the edges of the Herring River wetlands seem to be less common than around Wellfleet Harbor, but they appear to represent a similar span of occupancy. At least one Middle Archaic Neville-like point comes from the edge of the wetlands. The point was an isolated surface find (19BN417) near a newly constructed house. Some fill was in evidence around the foundation so the point may have been transported from somewhere else along with the fill. One of the sites tested by the survey, 19BN471, located near the former head of tide on the Herring River, produced evidence of Late Archaic and Woodland occupations. The much smaller 19BN434 appears largely to be a minor small stemmed tradition site. Closer to the harbor, but still well inside the wetland, are two important sites. Seth's Swamp, reportedly a stratified site that included shell deposits (Torrey 1946:50), produced evidence of Late Archaic small stemmed and broadspear components, as well as abundant Late Woodland material. The nearby Freeman-Paine site, which has never been well described in the literature, is a single component small stemmed tradition site (Moffett 1957:2; Massachusetts Historical Commission 1981). Although Freeman-Paine's setting is very different from 19BN281, a site at High Head, the two sites apparently share the characteristic of having numerous small stemmed tradition artifacts and very little else.

Truro Marsh, 19BN355/6 (Foldout Map J)

Single component:
Late Archaic small stemmed: Concentration 355.11(?), .12, .21(?); 356.11(?), .12(?), .21

Comments: Lowest quartz percentage on site is 74.9% (of 1465: concentration 356.21). Although total lithics are well under 100 in four of the Concentrations (355.11, .21; 356.11, .12), the high frequency of quartz implies that the entire site area is covered primarily with Late Archaic small stemmed material. One Squibnocket stemmed point in Excavation Unit 3 of 355.12 helps confirm the presence of small stemmed tradition occupations.

Truro Marsh, Summary

Site 19BN355/6 is predominantly a Late Archaic small stemmed point tradition site. This is indicated by the high percentage of quartz lithics in all concentrations (the range is 74.9% to 100%) and by the occurrence of a single Squibnocket stemmed point in one excavation unit. The significance of the minor amounts of other lithic materials, mostly felsic volcanics, is unclear. These materials could indicate that other components are also present on the site. Alternatively, they may have temporal significance within the small stemmed component, since Duncan Ritchie (1981:114) has noted an increasing preference for non-quartz materials in late small stemmed tradition components in southeastern Massachusetts. Pot hunting and a nearby gravel pit have taken a heavy toll on the site.

High Head Area, 19BN282 (Foldout Map K)

No components identified: Concentration .11, .21, .31

Single component (?):
Late Archaic small stemmed: Concentration .12, .22, .23, .24, .42

Multicomponent: Concentration .41 (LAss, MW)

Comments: Middle Woodland indicated by the occurrence of a Jack's Reef Pentagonal point in Excavation Unit 14 in

Concentration 41. Quartz ranges from 13.3% (of 850: Concentration 282.23) to 48.6% (of 146: Concentration 282.12) of the lithic assemblage among those concentrations with more than 100 lithics. (Quartz is also frequent among those concentrations with less than 100 lithics.) These high percentages indicate that Late Archaic small stemmed manifestations are present. Other lithic materials are in the majority in these concentrations, so one or more other, unidentified, components are probably also represented.

High Head Area, 19BN169 (Foldout Map K)

No components identified: Concentration 169.11, .21, .22, .23

Comments: Survey shovel testing produced only 83 lithics, none diagnostic. The assemblage is 24% quartz, implying that Late Archaic small stemmed, and probably other components, are present. Due to the small amount of material, no specific component assignments can be made. Moffett called this site Pilgrim Spring, but he never prepared a publication on it. He identified the site as Middle Woodland (Moffett 1957:5 and Table 1). This identification is apparently narrow, as the Massachusetts Historical Commission inventory for this site (Table 8.2) includes Late Archaic small stemmed and Susquehanna tradition artifacts, as well as Early, Middle, and Late Woodland points.

High Head Area, 19BN281 (Foldout Map L)

Single Component:
Late Archaic small stemmed: Concentration 281.11, .12, .13, .14, .15, .21, .22(sc?), .23, .24(sc?), .25, .26, .31, .32, .33, .34, .35, .36, .37, .38, .39, .41(sc?), .42(sc?), .43, .44, .45, .46, .47(sc?), .48(sc?)

Comments: Site 19BN281 is in a paleosol beneath an aeolian sand sheet. Soil characteristics suggest limited agricultural disturbance of site, and only a few isolated areas show evidence of pre-burial erosion. All non-sterile excavation units and shovel test pits produced assemblages overwhelmingly dominated by quartz; overall, of 8552 lithics > 0.25 in., 93.4% are quartz. Of 15 projectile points, six are untyped, one is a Squibnocket triangle (Concentration 281.24), two resemble Bare Island points (Concentrations 281.44 and .46), three are Squibnocket stemmed points (Concentrations 281.41, .43, and .46), and three show general small stemmed characteristics, but do not fit a named type (281.00 (2) and .46 (1)). The projectile point types and the abundance of quartz clearly show that a large small stemmed component covers the entire area. Since the site is sealed by a layer of wind-blown sand and since there is little evidence for other occupations of the site, all concentrations can be assigned a small stemmed tradition component. No evidence has yet been developed to determine whether all concentrations are contemporaneous or to place the concentrations in a temporal order.

Minor amounts of shell tempered pottery (total for site is 5.4 g, and sherds in four units are smaller than 0.25 in.) come from ten excavation units, located in six concentrations (Concentrations 281.22, .24, .41, .42, .47, and .48). The pottery tends to come from within the buried A horizon, which indicates that the pottery is probably in situ and has not been redeposited by wind. Ceramics occasionally occur in Late Archaic contexts in the Northeast, and Duncan Ritchie (1981:106) has recently reported an association of Vinette-like ceramics and small stemmed points in the Taunton River drainage. These early ceramics are usually grit-tempered (see Childs´ summary of New England ceramic studies in Chapter 14). This suggests that the shell tempered sherds are more likely to indicate a minor (late) Woodland presence on the site. Hence, the concentrations with sherds are indicated as possibly multicomponent.

High Head Area, 19BN415/481 (Foldout Map L)

Comments: This site covers most of Sample Units 197 and 199 The survey has not yet made concentration assignments for this site, and the material from the site has received only cursory attention. Projectile points include two Bare Islands, a Squibnocket stemmed, a Susquehanna broad/Wayland notched, and two possible Lagoons. Thus, small stemmed, Susquehanna, and Early Woodland components are suggested. Pottery from the site (Childs in Chapter 14) indicates Early, Early/Middle, and Late Woodland occupations. Site 19BN415/481 is close to the multicomponent Small´s Swamp site (Moffett 1959).

High Head Area, 19BN353 (Foldout Map L)

Comments: This site is in Survey Unit 97. The survey´s testing of this site was limited to heavily disturbed areas around a house foundation. This testing produced both historic and prehistoric materials. Prehistoric materials indicate the presence of Late Archaic small stemmed and other components at the site.

High Head Area, Summary

Evidence for Woodland components is rare in the survey´s collections from High Head. Among the sites for which concentration designations have been made only one Woodland component has been clearly identified. This is a Middle Woodland manifestation in Concentration 282.41. A thin scatter of tiny shell-tempered pottery sherds in several concentrations in 19BN281 hints at a minor amount of Woodland activity at that site; further evidence is neede confirm the postulated existence of this component. Artifacts from Moffett's old excavations at 19BN169 indicate that this site has a long history, and that it was used throughout the Woodland period (Massachusetts Historical Commission data summarized in Table 8.2). Additional evidence for Woodland occupancy in the High Head area came from several incompletely analyzed assemblages in the survey's collections and from Moffett's work. Site 19BN415/481 includes evidence of Early, Late, and possibly Middle Woodland occupations. Moffett's reports (1957, 1959) and collections (Massachusetts Historical Commission 1981 and Table 8.2) indicate that Woodland habitations were widespread in the High Head area. His data suggest that Woodland habitations tended to be located near the crest of the relict marine scarp and between the toe of the scarp and the salt marshes of East Harbor (now Pilgrim Lake).

All of the sites tested with excavation units produced evidence of small stemmed point components. In addition several sites in the area that were tested only with shovel test pits also have evidence of such components. One example is 19BN471, in the eastern part of Sample Unit 202 (Foldout Map K). Site 19BN281 seems to have considerable potential for characterizing this complex on the outer Cape, as it is apparently undisturbed. The site shows a broad band of high lithic and fire-cracked rock densities extending southwest of the southern edge of the kettle hole about which the site is situated. The span of occupancy that this site represents has not been determined, and unfortunately no material suitable for radiocarbon dating has been recovered. The site awaits further analytical attention, which should include comparisons with the unpublished, but artifactually similar, Freeman-Paine site in Wellfleet (material at R. S. Peabody Foundation for Archaeology, Andover, Massachusetts). Moffett's collections also show that small stemmed components are widespread at High Head (Moffett 1957; Massachusetts Historical Commission 1981; Table 8.2).

The Late Archaic period is also represented in the survey collection by a Susquehanna tradition component at 19BN415/481. Moffett's data indicate Susquehanna components at a number of his sites. His collections also show occasional evidence for Laurentian-like materials and Middle Archaic habitation (Table 8.2).

Provincelands, 19BN410 (Foldout Map M)

Radiocarbon Date:
370 ± 120 BP (GX-9707)

Comments: This small site is being deflated rapidly. The site includes small remnants of an old land surface armored with shell midden. Surrounding these low shell-covered mounds is a broad, low-density scatter of prehistoric and historic artifacts. This scatter is probably a product of wind transport. Artifacts recovered from the surface scatter include three Levanna points and a number of flakes of materials similar to those used to make the points. Only a few prehistoric artifacts were recovered from the midden itself; the assemblage includes only two flakes and 85 tiny shell-tempered sherds (total weight: 15 g). This limited evidence suggests that the midden is contemporaneous with the Late Woodland artifact scatter on the dune sand and is not a historic period deposit. The radiocarbon date of 370 $\pm$ 120 BP could indicate either a prehistoric or a historic age for the shell.

Provincelands Summary

Moffett (1946b, 1962) describes only one site in the Provincelands, and the survey's limited efforts on Provincetown Hook produced none through randomly selected sample units. Mr. Paul Bowen, a resident of Provincetown, brought 19BN410 to the survey's attention. This site appears to be part of the large Peaked Hill locality. Moffett (1962: 2) succinctly describes the archeology of the area: "Stone artifacts and small felsite workshops are uncovered from time to time in a valley-like depression in dunes." Moffett's (1962) photograph of the material he collected from Peaked Hill shows artifacts that cover a somewhat longer time-span than the 19BN410 Late Woodland component. Included in this photograph are nine Levanna triangles, two Rossville points, one Jack's Reef corner notched pint, eight large, leaf-shaped, bipointed bifaces (large Rossvilles or Greenes?), and five other stemmed bifaces. Thus, the peaked Hill site represents Middle Woodland (possibly Early Woodland, also) occupations, as well as the Late Woodland period.

The present active dune setting of 19BN410 (and the Peaked Hill locality) is a result of massive environmental disruption during the Colonial period (McCaffrey and Leatherman 1979). In the Woodland period the site was probably in a mature forest growing on stabilized dunes. The abundance of shells at 19BN410 also suggests that Provincetown's East Harbor (now Pilgirm Lake) extended closer to the site than it does today.

Whether additional sites exist in the Provincelands is not known. Searching for sites in the high shifting dunes might, because of present conditions and the area's recent geomorphic history, be a frustrating enterprise.

Summary and Discussion

Early Archaic

Prehistory on outer Cape Cod stretches back at least 9000 years. No Paleo-Indian material has been clearly documented as coming from the outer Cape. Early Archaic bifurcate-base points provide the earliest evidence of human habitation in the area. Such artifacts seem to be the widespread indicators of Early Archaic occupancy in the southern half of New England. Such artifacts date to about 8000-9000 B.P. (Coe 1964; Broyles 1971). A few bifurcate-base points appear in private collections from the outer Cape (Towle, appendix to this chapter; Chase 1983; Massachusetts Historical Commission 1981), but no well-defined assemblages have been described in print. The Park Service's collections include no Early Archaic artifacts.

The relatively meager evidence of Early Archaic habitation on the outer Cape may well be a product of the changes in the landscape that have taken place in the last nine millenia. Nine thousand years ago the outer Cape was broader in many places than it is today (Davis 1896; Strahler 1966:27-28,41), and sea level was nearly 30 meters lower (Oldale and O'Hara 1980: Figure 2). The Early Archaic artifacts from the outer Cape represent sites that were in low hills when they were occupied. These habitations would have been several kilometers inland from the ocean. Early Archaic people may well have inhabited places closer to the ocean and left sites in areas that are today submerged or eroded away.

The outer Cape seems to have a moderate abundance of Early Archaic artifacts, compared to adjacent parts of Massachusetts. Richardson (1983: 7) reports that evidence is almost absent for Early Archaic period habitation on Martha's Vineyard. In contrast, Early Archaic artifacts appear to be considerably more common on mainland areas of southeastern Massachusetts than on the outer Cape. Robbins (1980) describes a small amount of Early Archaic material at the Wapanucket site in Middleboro, and the nearby upper Taunton drainage has produced considerable numbers of Early Archaic bifurcate-base points (Taylor 1976). Dincauze (1974:44) notes that such points occur in a "significant but unstudied concentration" in the Narragansett basin of Rhode Island, as well as in southern Massachusetts (see also Snow 1980: Figure 4.4). She also reports that a few sites in the Boston basin have produced evidence of Early Archaic components. The significance of the varying abundance of Early Archaic materials over the southeastern New England area remains to be evaluated. Differing abundances may reflect variations in Early Archaic population density, intensity or frequency of use, or post-habitation landscape changes. All of these factors are probably important for explaining the differences between the outer Cape and adjacent areas in the distribution of Early Archaic artifacts.

Middle Archaic

The Middle Archaic period in New England dates from about 8000 BP to at least 6000 BP (Dincauze 1976: 119-125). This period is marked by an increase of sites and artifacts as compared to the preceeding Early Archaic period. However, evidence from these millenia of prehistory is still unabundant compared to that from succeeding periods. Occasional Neville and Stark points occur in private collections from outer Cape sites, including Pilgrim Heights and Warren´s Field in North Truro (Table 8.1), Taylor Hill (19BN106), Dummer Cove (19BN96), and Freeman-Paine (where Middle Archaic evidences are extremely limited) in Wellfleet (Massachusetts Historical Commission 1981), and the Chase collection from Eastham (Chase 1983). The Chase collection seems to have a much greater frequency of Nevilles (16 of 153 diagnostic points Chase 1983: Table 1) than other sites.

A few artifacts in the Park Service´s collections also indicate Middle Archaic period habitations, but the evidence is meager. Both of the Neville points in the survey assemblages are from surface collections. One projectile point is in a donated collection from the Fort Hill area (19BN194). The other is an isolated find in Wellfleet (19BN418), which may have been transported to its location of discovery with fill for a new house. A possible Stark comes from an isolated excavation unit in the northwestern part of the site at Coast Guard Beach, 19BN374. Since the find is isolated and its identification uncertain, its significance is difficult to evaluate. As with the Early Archaic, Middle Archaic sites may also have bewen common in areas that are today submerged or eroded away. Between 8000 BP and 6000 BP sea level rose from -23 m to -14 m (Oldale and O´Hara 1980:Figure 2).

This increase in the abundance of artifacts from the Middle Archaic period as compared to the preceeding period on the outer Cape has parallels in adjacent areas. Dunford (personal communication, 1983) has seen a few Nevilles and Starks occur in collections from the Cape. Richardson (1983) reports that the Middle Archaic period is well represented in surface collections and excavated material from Martha´s Vineyard. The locations of these sites suggest that fishing for anadromous fish and hunting may both have been important aspects of the subsistence-settlement system of Middle Archaic people on the island (Richardson 1983). Numerous Middle Archaic sites occur in southeastern New England (Dincauze and Mulholland 1977). Dincauze (1974:45) notes that even "the earliest Middle Archaic complex indicates by the number of sites and the frequency of artifacts a large increase in population over that of the Early Archaic." She also observes that Middle Archaic period sites commonly occur adjacent to rivers, lakes, and bogs, but cautions that complete Middle Archaic subsistence and settlement systems are difficult to infer because of coastal submergence (1974: 45).

Late Archaic

The Late Archaic is the first period when artifacts and sites occur in real abundance in New England. The outer Cape shares in this pattern, as well. The Late Archaic is also the first period for which the artifacts in the survey's collection provide substantial evidence for the identification of components. The three Late Archaic traditions differ in their prominence in the Seashore. Laurentian tradition components are quite rare, followed by Susquehanna tradition components. Small stemmed point tradition components are by far the most abundant, both in the survey collection and in other collections from the outer Cape.

The Late Archaic is also the first prehistoric period outer Cape Cod to provide evidence that people were consuming shellfish. Late Archaic shellfishing is documented by three radiocarbon dates on shell deposits at 19BN308. All of these dates fall into the fourth millenium before present. Unfortunately, none of the samples was directly associated with diagnositc artfiacts, so at this stage of the analysis the cultural identity of these early shellfishing people remains unknown.

The youngest date, 3260 ± 135 BP, comes from the lowest level of intact shell midden in Excavation Unit 107 of Concentration 308.42. This assay is on a sample of oyster (*Crassostrea virginica*) shells. Excavation Unit 300, 116 m away *in Concentration 308.33*, produced a slightly older date, 3350 ± 170 BP. This second assay was made on a sample of quahog (*Mercenaria mercenaria*) shells from the lowest level of intact *shell midden in the* excavation unit. These two radiocarbon ages come from separate areas of intact shell midden at the site, but the dates are statistically contemporaneous. The oldest date, 3925 ± 180 BP, comes from a shell deposit buried beneath salt marsh sediments. Auger Hole 802, about 16 m southeast of Excavation Unit 300, provided the sample of quahog shells for this date. The characteristics of the sediments in the auger hole (Figure 8.2) suggest that the shell deposit is intact, and the associated bone fragments and flake indicate that the shell layer is a man-made deposit. The shell for this sample came from the uppper portion of the deposite. Nauset Marsh may well hide even older evidence of Archaic shellfishing.

In addition to these three dates, another assay from Park Service excavations relates to the Late Archaic period. One of the charcoal samples from Excavation Unit 9 at 19BN390 (Concentration 390.33) produced an age of 3315 ± 145 BP. Although Concentration 390.33 produced evidence of two Late Archaic components, stratigraphic problems make it impossible to attribute the date specifically to either one.

Laurentian tradition. Laurentian tradition artifacts in *the Survey's collections* are restricted to a single Otter Creek projectile point. This artifact is the sole evidence for the only Laurentian component noted at Seashore sites; the component is in 19BN274/339, Concentration .12. The survey has recovered no other evidence of this tradition, either in the form of additional Otter Creek points or other kinds of Laurentian artifacts, such as varieties of gouges, adzes, plummets, ground slate points and knives, and bannerstones (Ritchie 1969a: 79). Nor have other Laurentian projectile point types, like those of the Brewerton series, been noted in the survey collections. This dearth of Laurentian artifacts reflects the low intensity of use of the outer Cape by Laurentian tradition populations. Collections included in the Massachusetts Historical Commission's inventory (1891) show a low frequency of artifacts representing any of the phases of the Laurentian tradition. Linda Towle, in the appendix to this chapter, notes that in the Moffett and Torrey collections, Brewerton projectile points are far more common than Vergennes phase (Otter Creek) material. According to the Commission's inventory, Brewerton projectile points have their highest frequency at High Head. Two of Moffett's sites, Holden and Warren's Field, provide most of the Brewerton artifacts in this cluster at High Head (Massachusetts Historical Commission 1981: 9). The differences between the kinds of artifacts in the Park Service's sample and those in private collections is probably largely a product of the small size of the survey's site assemblages.

The abundance and types of Laurentian tradition artifacts on the outer Cape accord well with Ritchie's (1969b: 213) comment that the Laurentian in southern New England is "weakly but rather widely represented," and in this area the tradition "contains some elements characteristic of the three phases recognized in New York State." Much evidence indicates that the Laurentian is a more concrete archeological entity in northern New England.

Susquehanna tradition. Atlantic phase (Dincauze 1972) materials are quite rare in the survey's collections. The only indication of this entity's presence is a single possible Snook Kill/Atlantic projectile point from 19BN417. This site number refers to a donated collection from a garden a few hundred meters from 19BN333/6/7. In the MHC inventory, the Atlantic phase is thinly represented on the outer Cape. The North Truro area produced most of the Atlantic points (Towle, appendix to this chapter).

Seven Susquehanna broad/Wayland notched projectile points represent the Watertown phase (Dincauze 1968: 71-88) or related entities at a total of five concentrations--323.21, 341.23 (2 points), 390.33, 374.21 (2 points), and 415.00. At the time of this writing no other artifacts of this cultural entity have been identified in the survey collections. Like the Atlantic phase, artifacts of the Watertown phase are not abundant on the outer Cape, according to the Massachusetts Historical Commission inventory. The Coburn site on Barley Neck in Orleans is a small late Susquehanna tradition cemetery (Kremp 1961; Dincauze 1968: 13, 66-70, 85-87). This site may indicate that Susquehanna tradition components more substantial than those produced by the survey's work await discovery on the outer Cape.

Assemblages from two sites, 19BN374 (Concentration 374.11) and 19BN417 each produced one biface with general broadspear characteristics (Witthoft 1953). Neither is diagnostic of a particular phase of the Susquehanna tradition.

In addition to this small amount of Susquehanna tradition material, the survey's collections also include minor indications of Orient phase components; one Orient type projectile point comes from 19BN308 (Concentration 308.41) and another come from 19BN390 (Concentration 390.00). This low abundance of Orient material again parallels the pattern of low artifact density of this style of artifact seen in the collections included in the MHC inventory from the outer Cape (Towle, appendix to this chapter).

Evidence of the Susquehanna tradition is widely distributed in southern New England (Dincauze 1974:49). However, authors commonly complain that well excavated and well described components are rare. As Ritchie (1969b: 219) put it some years ago:

> Better sites of the Susquehanna tradition are needed in New England. They doubtless exist on Martha's Vineyard as attested by the prevalence of such point forms in surface collections and could probably be found and excavated if sufficient time were available to us.

Unfortuately, the survey data from the seashore have little to contribute to alleviating this problem.

Small stemmed point tradition. The small stemmed point tradition is the segment of the Late Archaic when habitation was most extensive and intensive. Of the 23 sites included in the chronological summary section of this chapter, only three produced no indications of the presence of this tradition. In addition, 66 of 96 concentrations included the small stemmed point tradition as at least one of their identified components. At 19BN387 the lack of any indication this tradition may be attributable to the limited nature of the excavations. These focused solely on the ossuary and did not attempt to examine the site as a whole. The location and depositional context of 19BN410 may account for the lack of such material at that site. Since the Provincelands were still forming 4000 years ago (Zeigler 1965: Figure 6), it is not clear whether the 19BN410 area would have been available to Late Archaic people for habitation. In addition, in the unstable dune landscape of the the area, sites could easily be buried or eroded away, obscuring all evidence of their existence. Evidence of this tradition at 19BN374 is quite limited and is entirely absent at 19BN323. Only at these sites does the lack of small stemmed tradition material seem to be a genuine expression of these Late Archaic people's settlement pattern. A preliminary examination of the sample unit data suggests differences between the small stemmed point tradition settlement pattern and that of the Late Woodland. Most commonly Late Woodland sites are located adjacent to bays and inlets, such as Nauset Marsh, Wellfleet Harbor, and Provincetown's East Harbor (now called Pilgrim Lake). Late Woodland sites do not typically occur in other settings. Late Archaic small stemmed point tradition sites are also common in areas adjacent to bays and inlets. In addition they occur in othe settings. Some sites are adjacent to freshwater marshes. One example is 19BN355/6. Others are small sites in isolated "upland" settings; 19BN434 may be an example of this kind of site. Still other sites are close to bays, but not adjacent to them. Sites 19BN281 and perhaps 19BN479 are examples of this kind of site. Differences in subsistence strategies may be responsible, but more work is needed to fully understand why these Late Archaic small stemmed tradition sites occur in many places that Late Woodland sites do not (see Chapter 16).

Site 19BN281 offers the best example among the survey's assemblages of a small stemmed point tradition site. The site has produced several varieties of small stemmed projectile points, including examples of Wading River and Squibnocket Stemmed types. Squibnocket triangles are uncommon, being represented by only a single specimen among those tabulated in Table 8.4. The assemblage from 19BN281 also includes a number of examples, mostly of stone fragments, of a stemmed biface form that does not appear to fit into any named projectile point type. The few more complete specimens have blades similar to the Squibnocket Stemmed type--excurvate blade edges and weakly defined shoulders; the bases, however, are straight and have distinct ears, unlike the Squibnocket Stemmed type. Such bifaces also occur at other outer Cape sites.

Site 19BN281 shows the typical small stemmed point tradition dependence upon quartz. For the site as a whole, nearly 94% of all lithics are quartz. Debitage indicates a pebble-based technology at the site.

The 19BN281 includes a wide variety of chipped bifaces and debitage, but these have not yet been enumerated in detail. Ground stone tools are rare. The excavation of a 33 square meter block in the fall of 1983 produced only two examples: a large fragmentary plummet and a small gouge. Previously no ground stone tools had been identified among the artifacts from the 1979 shovel test pits or the 164 excavation units dug in 1980.

Private collections from the outer Cape show the same prominence of small stemmed point tradition material as the Park Service's. All of Moffett's major sites in the High Head area produced evidence of this tradition (Table 8.2). One of the other important small stemmed point sites on the outer Cape is Freeman-Paine in Wellfleet, which with the exception of two Neville-like points and one Otter Creek, is a single component site (Massachusetts Historical Commission 1981: 8). Overall small stemmed points are the second most common variety on the outer Cape, exceeded only by Levannas (Towle, appendix to this chapter).

The dramatic increase in archeological remains with the appearance of the small stemmed point tradition is a widespread pattern in southern New England. In southern New England people of the small stemmed point tradition had a high population density and exploited a wide variety of habitats (Dincauze 1974: 47-48). Ritchie and Funk (1973: 341) observe similar high artifact abundance and diversity of site locations in the small stemmed point tradition of eastern New York.

Ritchie (1969b: 215-219) defines the Squibnocket complex as the major manifestation of the small stemmed point tradition on Martha's Vineyard. Similarity of artifact assemblages indicate the that Squibnocket complex is closely related to the Sylvan Lake complex (Funk 1976: 247-254) of eastern New York. Technologically, the Squibnocket complex is characterized by a quartz pebble industry (see also papers in Barber 1981).

The people of the Squibnocket complex lived, according to Ritchie, in relatively self-sufficient communities, hunted extensively, and were the first to have seriously exploited shellfish. Others interpret Squibnocket complex shellfishing differently. Braun (1974) views Squibnocket shellfish use patterns as the result of environmental opportunism and not naivete about marine resources, as Ritchie suggests. Richardson (1983) points out that earlier evidences of Archaic shellfish use on the Vineyard may well be submerged beneath the Atlantic Ocean. The origins of the small stemmed point tradition are uncertain. Ritchie (1969b: 219) regards it as a cultural complex that moved into the Northeast from the Mid-Atlantic region. Dincauze (1974: 47) views it as an indigenous New England tradition, evolved from the region's Middle Archaic cultures.

Early Woodland. In the survey's collections, the first millenium, more or less, of the Woodland period is marked by a low frequency of artifacts, compared to the preceeding Late Archaic period. Park Service site assemblages include a total of one Meadowood, five Lagoons, and three Rossvilles. Other evidence of Early Woodland manifestations includes thick, grit-tempered, interior-exterior cord-marked ceramics. Such wares are found in five concentrations. Taken together seven sites (19BN323, 19BN341, 19BN288, 19BN390, 19BN417, 19BN471, and 19BN415) provide evidence of Early Woodland occupations. Among those sites divided into concentration areas (four of the seven), evidence of Early Woodland components occurs at eight concentrations.

A decrease in the abundance of sites and artifacts representing the Early Woodland period is also shown by the collections in the MHC inventory. The decline is not as severe in these collections as it is in the Park Service's material. Unlike the survey asemblages the MHC inventory shows Rossville points to be relatively numerous (Towle, appendix to this chapter). The reasons for this difference have not been discerned. All of Moffett's major sites at High Head have evidence of Early Woodland components (Table 8.2). Another site with a large Early Woodland assemblage is Rose, which is in Truro somewhat south of High Head (Moffett 1951; Massachusetts Historical Commission 1981).

On Martha's Vineyard Ritchie (1969b: 224-225) recovered sufficient evidence to identify an Early Woodland cultural unit, the Lagoon complex. His comment (1969b: 225) regarding the prevalence of Lagoon and Rossville points in surface collections from the Vineyard implies a density more in accord with the MHC inventory data for the outer Cape than with the material produced by the Park Service's survey. On southeastern New England's mainland Early Woodland sites are thinly distributed. The infrequency of sites is one of the reasons, according to Dincauze (1974: 50), that the earlier "Woodland cultures of southern New England have proven to be more difficult to define than their predecessors." The comparative thinness of prehistoric remains during this time period has been widely attributed to a population decline (e.g., Dincauze 1974: 51), but other interpretations have also been advanced (Barber 1983).

Middle Woodland. The last 1300 years or so of prehistory on the outer Cape again show an abundance of sites and artifacts. This increase in evidence begins during late Middle Woodland times. Middle Woodland projectile points included four Fox Creeks from three sites, 1 Greene, and 11 Jack's Reefs from four sites (eight of these are from 19BN274/339). Middle Woodland ceramics, characterized by grit temper and a wide variety of decorative techniques (see Chapters 13 and 14 for details), come from at least four sites. Chert percentages in excess of 1% are associated with several of the concentrations that have Middle Woodland projectile points or ceramics. High chert percentages also occur in two concentrations at 19BN288, where other indications of Middle Woodland components are lacking.

Concentration 274.12 at 19BN274/339 provides the survey's best example of a Middle Woodland component. The excavated artifacts include eight Jack's Reef projectile points. The percentage of chert artifacts and debitage is among the highest seen at any concentration; chert comprises 3.9% of 2139 lithics. Middle Woodland ceramics from Concentration 274.12 include grit-tempered vessels decorated with incising, scallop shell impressions, and punctations in triangle-based motifs. Two radiocarbon dates from the small shell-filled pit in Excavation Units 16 and 23, 1265 ± 130 BP (charcoal) and 1570 ± 120 BP (shell), provide an age estimate for this component. (The three hundred year difference between these two dates is unexplained.) A third date of 1285 ± 120 BP (shell) from the concentration may also refer to the Middle Woodland component. It may also be attributable to a Late Woodland component in the concentration, if shell dates from Nauset are in systematic error. Site

19BN390 also provides a clear Middle Woodland radiocarbon date: 1600 + 130 BP (charcoal). Analysis of this site has not yet identified an assemblage associatied with this assay. Several of the dates from 19BN341 are also sufficiently old to be attributed to a Middle Woodland presence at this site. Middle Woodland artifacts are not obvious in the concentration assemblages. The radiocarbon dates from 19BN274/339, 19BN390, and possibly 19BN341 provide good evidence of the use of shellfish on the outer Cape during the later Midlle Woodland period.

The Massachusetts Historical Commission inventory shows a decline in the abundance of Middle Woodland projectile points as compared to the totals for Early Woodland points. Important Middle Woodland sites represented in private collections include Rose (Moffett 1951; Massachusetts Historical Commission 1981), and a member of Moffett's High Head site (Table 8,2) in Truro and a site on the Auduobon Sanctuary in Wellfleet (Linda Towle, personal communication, 1984). Moffett's Peaked Hill assemblage (Moffett 1946; 1962: 2) appears to include a Middle Woodland component, indicating some use of the Provincelands during that time.

On Martha's Vineyard Ritchie (1969b: 225-227) recognized the a Middle Woodland presence, but felt his evidence was insufficient to formally define a cultural complex. The Kipp Island-like assemblage he excavated in Stratum 3 of the Cunningham site (1969b: 107-111) shows many parallels to the ceramics and lithics in the Middle Woodland assemblage at 19BN274/339.

The late Middle Woodland assemblages of the outer Cape also fall well within the range of such assemblages from mainland areas of southeastern New England, and throughout the region sites increase in abundance toward the end of the Middle Woodland period (Dincauze 1974: 51).

Late Woodland. The Late Woodland period is the most prominent period of prehistoric habitation in the Nauset area. Thirty-seven of the 54 Nauset area concentrations with identified components have evidence of Late Woodland occupancy. Every Nauset site except the small sites 19BN273/275 and 19BN340 produced at least one Levanna projectile point. Late Woodland ceramics are also widely distributed in the Nauset area.

The high frequency of Late Woodland components at Nauset area sites implies that many of the artifacts and much of the debitage at these sites were probably deposited during this period. Plowing has generally disrupted whatever stratigraphy once existed at these sites. This makes it impossible to separate those non-diagnostic artifacts belonging to the Late Woodland period from those of preceeding periods with any accuracy. Indeed, even estimating the proportions of Late Woodland to earlier artifacts is tricky. There is no reason to assume a constant proportional relationship between diagnostic and non-diagnostic artifacts. In addition, at Nauset the concentrations that received the most sustained attention in the field tend to be those which can now be identified as having multiple components. Thus, concentrations that at present appear to have only a single component may actually be the product of several different periods of occupancy, of which the Late Woodland period is the most prominent.

In Wellfleet the Indian Neck ossuary (Bradley et al. 1982) provides substantial evidence of Late Woodland mortuary practices on the outer Cape. In North Truro the survey's data, supplemented by Moffett's excavations and the Massachusetts Historical Commission inventory, indicate that Woodland habitations were restricted to areas near the toe and crest of the relict marine scarp at High Head. Small stemmed point tradition sites, by contrast, are more widely distributed at High Head, occurring on the flat outwash plain, as well as near the old scarp. Site 19BN410 in the Provincelands indicates Late Woodland habitation in that area.

Sites 19BN308, 19BN323, 19BN341, 19BN387, and 19BN410 all provide radiocarbon dates for the Late Woodland period. These dates span the entire length of the Late Woodland period, but most fall before about 750 BP. Several of the radiocarbon dates and associations between Late Woodland artifacts and shell middens show that shellfishing was widespread during this period on the outer Cape.

The Massachusetts Historical Commission inventory data show much the same pattern that the Park Service's data do: Late Woodland artifacts are widespread and abundant on the outer Cape. In addition to the North Truro and Nauset areas, other important clusters of Late Woodland sites include the Corn Hill-Pamet River area of Truro and Wellfleet Harbor. Other parts of the outer Cape's protected shorelines probably also contain significant Late Woodland sites. The Chase collection in Eastham provides an example of one such site (Chase 1983).

The high density of sites during the Late Woodland on outer Cape Cod is part of a general pattern in southern New England. Dincauze (1974: 55) says that the "Late Woodland popluation density in the Boston area seems to have been comparable to that of the Late Archaic, with the difference that the Woodland peoples intensively occupied only the coastal zone." Ritchie (1969b: 227-228) sees close similarities between the cultures of the Late Woodland in southern New England and the prehistoric Algonkian cultures of southeastern New York.

Conclusion

Prehistoric people began coming to the outer Cape at least 9000 years ago. From a chronological point of view, the sequence of sites in the seashore accords well with the prehistoric record in southeastern New England as a whole. With few exceptions the relative abudances of sites and artifacts from the different time periods are exactly what one would expect based on the region as a whole. Other chapters and future analyses will use this chronological framework to describe the prehistory of the Seashore and to analyze the reasons for the changes in the distributions and abundances of artifacts that this chapter has enumerated.

Acknowledgements

Thanks to Charles Sullivan of Geochron Laboratories, Cambridge, for discussing with me the radiocarbon dates; to James W. Bradley and the Massachusetts Historical Commission for permission to cite their data; to Linda Towle for her insights into Eastern Massachusetts prehistory and for her explanations of the Massachusetts Historical Commission artifact coding system; to Alison Dwyer for her help preparing radiocarbon samples for shipment, putting together tables, and checking over this manuscript; to Terry Childs, Joyce Fitzgerald and George Stillson for sharing their thoughts on the Cape's prehistory; and to Innes Borstel for her continuing patience with this project. The manuscript benefitted from the comments of Frank McManamon and Martha Pinello. Any errors remaining are mine.

APPENDIX TO CHAPTER 8

Observations on Projectile Points in the Seashore Survey Collections

Linda A. Towle

[NOTE: From 1979 to 1981 Linda Towle was one of the contractors for the Massachusetts Historical Commision's prehistoric collections inventory (Anthony et al. 1980). One of the institutions Towle and her colleagues inventoried was the Robert S. Peabody Foundation for Archaeology at Andover, Massachusetts. This repository holds the collections of Ross Moffett and Howard Torrey. Moffett and Torrey were avocational archeologists who, during the middle decades of this century, amassed large collections of artifacts from the outer Cape. These collections, numbering about 16,000 specimens, form an important resource for the study of Cape Cod's prehistory. Readers wishing more information about the strengths and weaknesses of these collections should consult the Massachusetts Historical Commission (1981).

Because of Towle's experience with the Moffett and Torrey collections, she was invited to examine the projectile points gathered during the National Park Service's survey of the Seashore. As a result of this examination, she prepared a report comparing the Park Service's projectile point collection to points in the Moffet and Torrey collections. Her report is appended to this chapter. I have made minor editorial changes to make it consistent with the rest of the chapter. One difference between Towle's original report and this version is in Table 8.4. Towle classified the small stemmed points into four categories which do not precisely fit the named types (Small Stemmed I through IV of Anthony et al. 1980). Various small stemmed type names are used in Table 8.4. This difference does not affect Towle's conclusions, nor did it mean making major revisions to the text. --C.3.]

I classified 271 artifacts from the Cape Cod National Seashore archeological survey project using the Massachusetts Historical Commission (MHC) Prehistoric Survey Team's typology (Anthony et al. 1980). These artifacts included 218 projectile points and 63 bifaces from 24 park sites.

Of the projectile points (Table 8.4), 55 were untypable. The remaining 163 points were assigned to the following time periods:

3	Middle Archaic
71	Late Archaic
10	Early Woodland
15	Middle Woodland
65	Late Woodland

Late Woodland Levanna triangles were the most common type of point (40%), followed by Late Archaic small stemmed points (18%), and Squibnocket triangles (17%).

Although the points in the Park Service's collections constitute a small sample, the spatial distribution of the various types follows patterns observed in the Moffett and Torrey collections. These collections, inventoried by the MHC Prehistoric Survey Team at the R. S. Peabody Foundation in Andover, contained nearly 16,000 provenienced artifacts, primarily from sites in Wellfleet and Truro.

Nauset

The largest quantity of diagnostic points from the survey came from sites in Eastham, where Middle Archaic to Late Woodland materials were present (Table 8.4). In contrast, Eastham was not well represented in the Moffett and Torrey collections. One Early Archaic bifurcate base point was collected by Torrey from the Indian Rock site (19BN190) near Skiff Hill on the west shore of Salt Pond Bay. The Park Service's collections include no Early Archaic artifacts from the Nauset area.

The 137 diagnostic points recovered from seashore sites in Eastham included one Middle Archaic Neville and one Middle Archaic Stark point. The Neville comes from the donated collection at Fort Hill (19BN194), and the Stark is from Coast Guard Beach (19BN374). The Moffett and Torrey collections contained only three Nevilles from Eastham, all from unrecorded locations.

The 53 Late Archaic artifacts in the Park Service's collections from Nauset represented all the major traditions except Brewerton. Squibnocket triangles and Small Stemmed points comprised 79% of the Late Archaic points from Eastham. The only Otter Creek point in the Park Service's collection was found at

19BN274/331. Very few Otter Creek points were inventoried in the Moffett and Torrey collections.

The occurrence of Early and Middle Woodland points from Park Service sites in Eastham differed from the patterns observed in the Moffett and Torrey collections. In those collections, Early Woodland Rossville points were more common than any Late Archaic point type except small stemmed points. This was contrary to the expected decrease in material remains that would be associated with a significant population decrease which has been postulated for the Early Woodland (e.g., Dincauze 1974:51).

The Moffett and Torrey collections contained 25 Rossvilles scattered across several sites in Eastham, while the Park Service´s sites yielded one Rossville.

Points excavated by the survey from sites in Eastham did include eight Jack´s Reef Corner Notched points found at 19BN274/339 on the west side of Salt Pond Bay. Only three Jack´s Reefs were identified in the Moffett and Torrey collections from Eastham, and these were from unknown proveniences.

Late Woodland Levanna triangles comprised nearly half of the diagnostic points at the Park Service´s sites in Eastham, outnumbering all of the Late Archaic points. Levannas were the most common artifact at each of the Eastham sites, except 19BN390 and 19BN333/6/7 on the North Shore of Salt Pond Bay. The abundance of Levanna triangles in the Park Service´s collections from Nauset is similar to the Moffett and Torrey collections, in which Levannas were the most common artifact type, outnumbering Small Stemmed points (2,025 vs. 1,862).

In comparison to collections from other areas of eastern Massachusetts, Cape Cod has a much larger quantity of Levanna triangles, and there is a Levanna component at almost every site (except in the High Head area). Certain areas of eastern Massachusetts, such as the Concord/Sudbury River Valley, show little evidence for Late Woodland occupation. It would appear that there was an increase in population on the Cape during the Late Woodland, and this may reflect a general population shift from the interior to the coast during this period.

Wellfleet

The Park Service´s collections from sites in Wellfleet were small. However, they included examples of projectile points from every time period from Middle Archaic onwards (Table 8.4) A similar broad time range was represented by the artifacts in the Moffet and Torrey collections. It is interesting that, in the collections in the MHC´s inventory, which contained over 2,000 diagnostic projectile points from Wellfleet, the only provenienced Neville points came from the Wellfleet Harbor area. Wellfleet Harbor also produced one of the few sites with an extensive Fox Creek component--a site which is located in the vicinity of the Audubon Sanctuary in South Wellfleet.

High Head

The High Head area of Truro was recognized from the Moffett and Torrey collections as an area of intense Late Archaic activity. All the major Late Archaic traditions were present: Brewerton, small stemmed/Squibnocket, Atlantic/Susquehanna, and Orient. Of the 311 Late Archaic points inventoried from the four major sites on High Head (19BN159, 19BN164, 19BN168, 19BN169), 59% were small stemmed points. The remaining points were evenly distributed among the other traditions. The densest concentration of Atlantic/Susquehanna materials in the Moffett and Torrey collections occurred on High Head, and a cache of Wayland notched points and Coburn blades was recovered from this area by Henry Meniz, whose collection is in the Bronson Museum.

The Park Service's sample from sites on High Head (Table 8.4) contained 16 Late Archaic points, 13 of which were small stemmed. The remainder were two Squibnocket triangles, and one Susquehanna Broad. There were no Brewerton artifacts recovered in Park Service excavations at High Head, or at any other seashore sites.

Although Late Woodland Levanna triangles were the most common artifact in the Moffett and Torrey collections, only a dozen of the Levannas in these collections come from the High Head sites. This dearth of Woodland material is also observed in the Park Service's sample from High Head, which contained only three Woodland points. One is a finely worked Jack's Reef pentagonal; the other two are possible examples of Lagoons.

The Park Service's sample from High Head contained no artifacts datable to the Middle Archaic, or any earlier period. The earliest artifacts in the Moffett and Torrey collections from the High Head sites were 4 Middle Archaic Neville and Stark points.

General Comparisons

Using the small Park Service sample of diagnostic points alone, it would be difficult to perceive many of the patterns of site distribution over time that I have presented above. However, by comparing the Park Service's sample to the patterns observed from the Moffett and Torrey collections, it is possible to evaluate the Park Service's data against a larger sample. Several similarities between the two samples were noted:

1) There is a thin scatter of Middle Archaic materials across the outer Cape area.
2) Small stemmed points are the most common Late Archaic artifacts.

3) There is some Atlantic/Susquehanna and Orient material at sites on the outer Cape.

4) Late Woodland Levanna triangles are the most common artifact, outnumbering small stemmed points.

5) In comparison to the rest of the outer Cape area, High Head has relatively little Woodland material. It appears to have been utilized primarily during the Late Archaic.

Two major differences were observed between the two samples:

1) The Park Service´s sample contained no Late Archaic brewerton artifacts.

2) And, the Park Service´s sample contained almost no Rossville points.

The lack of brewerton artifacts may be attributable to the small size of the Park Service´s sample, since these forms were not that commmon in the Moffett and Torrey collections. However, Rossvilles were quite common in those collections, occurring in small quantities at sites across the outer Cape. Their absence in the Park Service´s sample could also be due to the small sample size, but other explanations should be sought.

Other Observations

In addition to projectile points, I examined 63 bifaces from the seashore sites. The bifaces which I selected were generally preforms for points, in later stages of the manufacturing process. I felt that this sample might supplement the cultural data derived from the diagnostic points.

One interesting group of bifaces was recovered from 19BN341, on the north side of Nauset Bay. The eight triangular preforms were in various stages of reduction, including two chunky ones which still had the cobble rind visible on one surface. Three others had finely chipped bases and edges, and were clearly intended to be Levanna triangles. These bifaces all had burrs on them which indicated that they were chipping failures. Twenty-five finished Levannas were also recovered from this site.

Four other bifaces could have been preforms for Greene points, of which only one finished specimen was found in the Park Service´s sample. These bifaces also had burrs indicating that they were chipping failures. One possible Meadowood blank was also identified.

The remaining bifaces which I examined were in various stages of manufacture, and did not provide any further diagnostic information.

While inventorying the points and bifaces, I also recorded raw material for each artifact. There are some interesting differences between the raw materials used on the outer Cape and those used in other parts of eastern Massachusetts. One material which is commonly used on the Cape was classified as dark brown quartzite in the MHC inventory, and as fine-grained felsic volcanic in the Park Service's system. This material was common in the collections from the Cape which the MHC Prehistoric Survey Team inventoried, but was seldom found in collections from other areas.

Two raw materials were conspicuous for their absence in the Park Service's artifacts. The first was argillite, which was very common in collections from eastern Massachusetts. However, collections from the outer Cape, including Martha's Vineyard, produced few argillite artifacts. The second material was a blue-grey felsite with glassy phenocrysts, the source of which is in the Blue Hills in Milton. Although this material was not abundant in collections from eastern Massachusetts, it was absent from the Park Service's sample.

Ten Park Service artifacts were made of Pennsylvania jasper, a butterscotch-colored chert whose source is believed to be in Pennsylvania. All of these artifacts, six Middle Woodland Jack's Reef Corner Notched points and four other implements, were found at 19BN274/339, on the west shore of Salt Pond Bay. This site also contained two Jack's Reefs made of hornfels. This was the only occurrence of this material in the Park Service's sample. Hornfels was commonly used for Middle Woodland points in other collections from eastern Massachusetts.

My final observation on raw material concerns the use of quartz. In the Park Service's sample, it was most commonly used for small stemmed points and Squibnocket triangles. This is also true for most other areas in eastern Massachusetts, except the Taunton Basin where quartz is the dominant raw material for most artifacts, through all prehistoric time periods.

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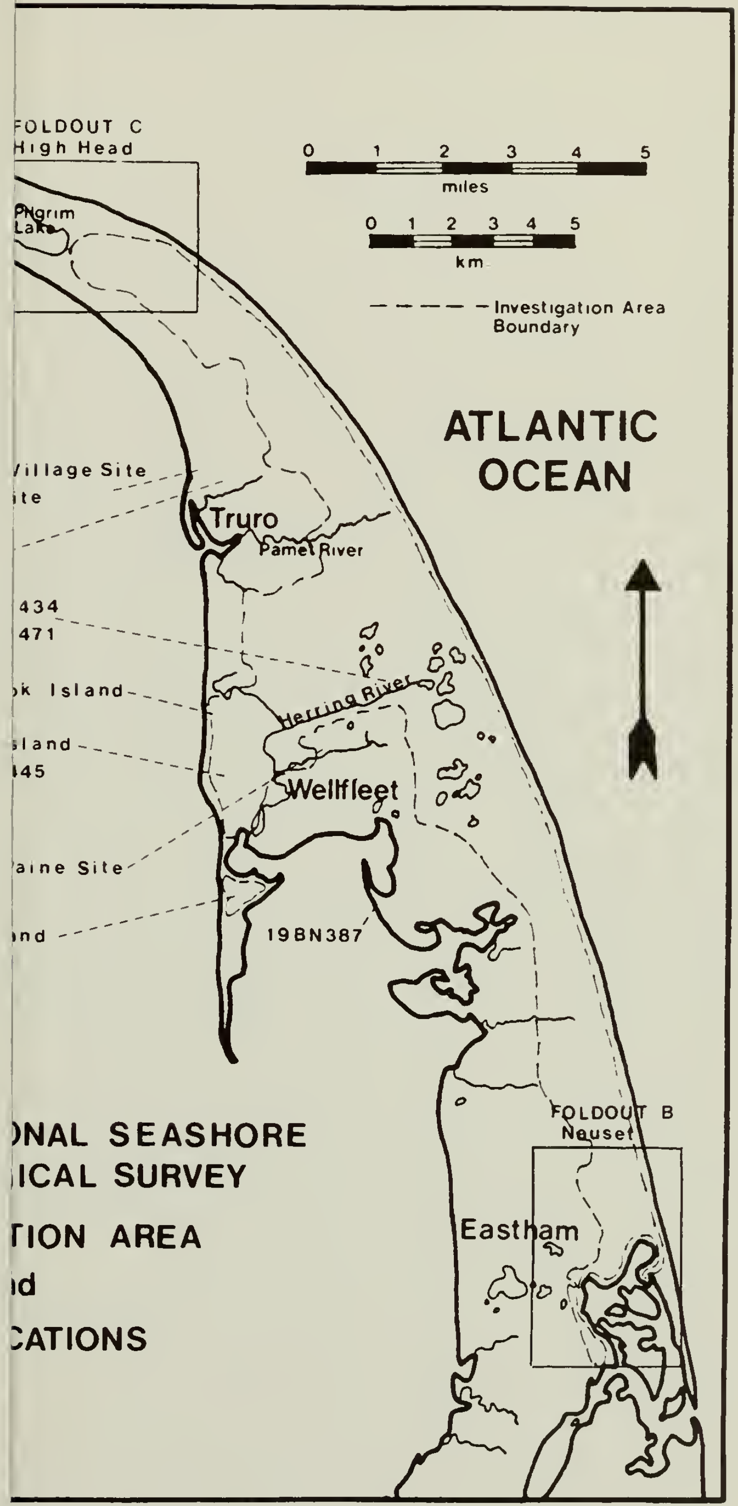
☆ U. S. GOVERNMENT PRINTING OFFICE: 1984--702-474--516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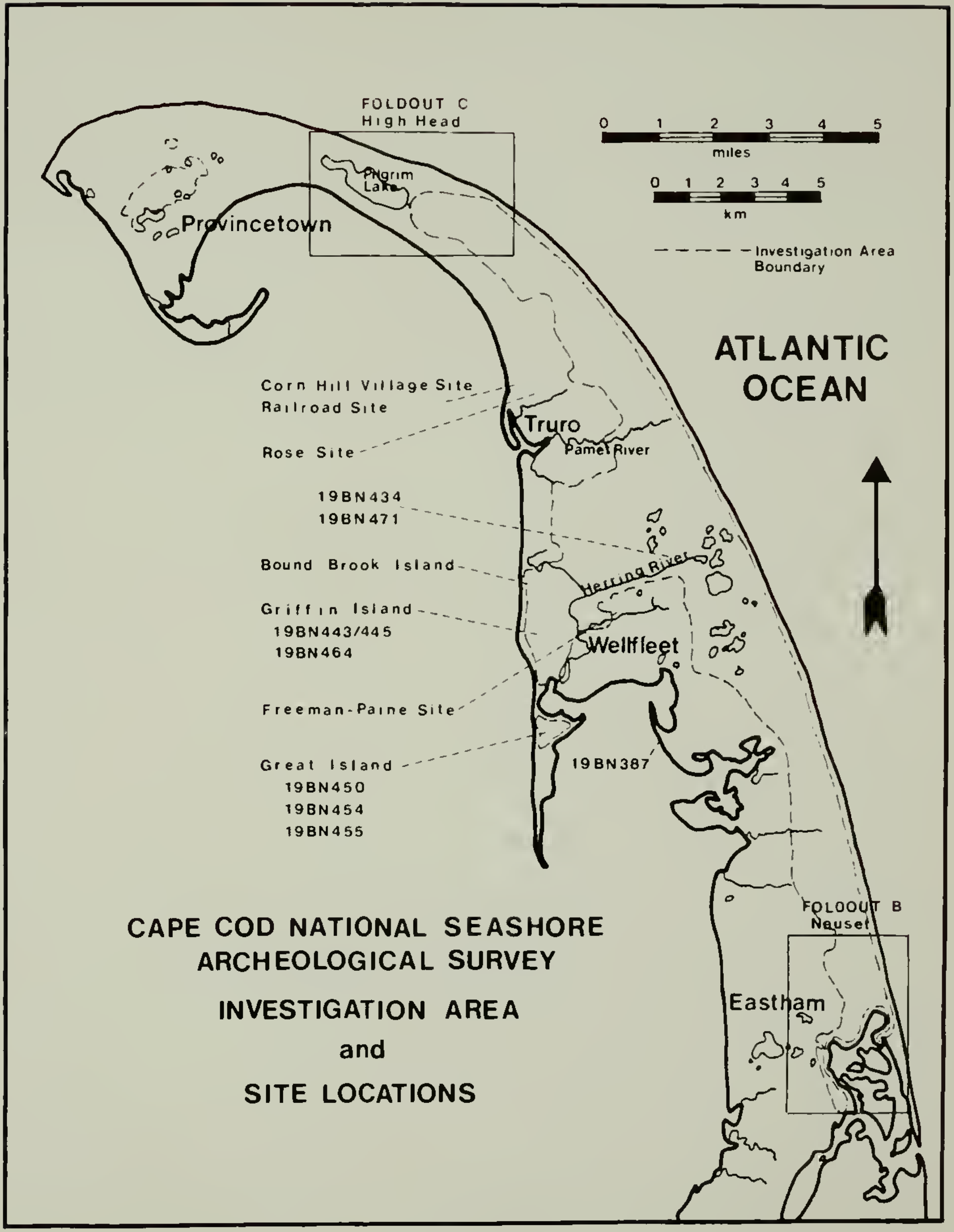
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Corn Hill Village Site
Railroad Site
Truro
Rose Site
Pamet River
19BN434
19BN471
Bound Brook Island
Herring River
Griffin Island
19BN443/445
19BN464
Wellfleet
Freeman-Paine Site
Great Island
19BN450
19BN454
19BN455
19BN387
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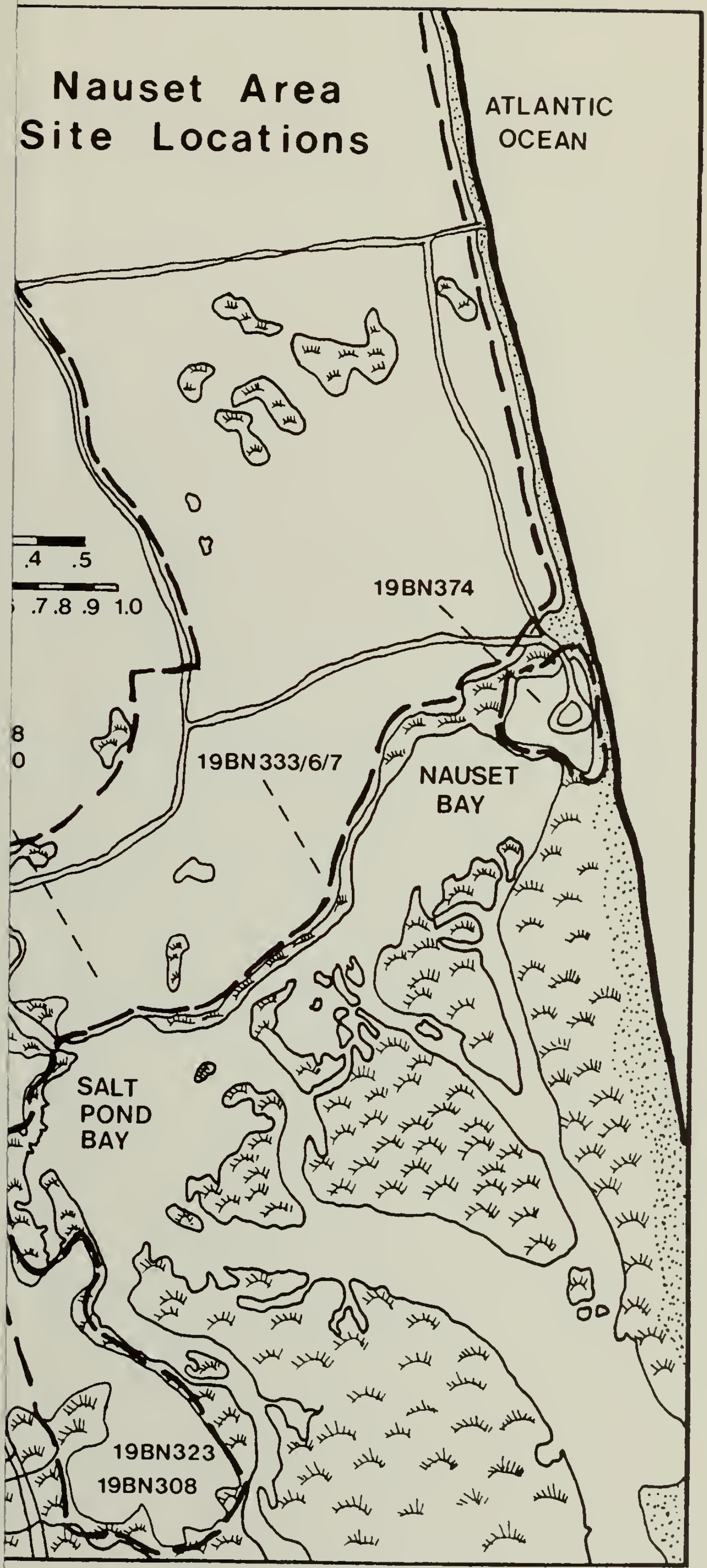
CAPE COD NATIONAL SEASHORE
ARCHEOLOGICAL SURVEY
INVESTIGATION AREA
and
SITE LOCATIONS

FOLDOUT A



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NAUSET BAY
SALT POND BAY
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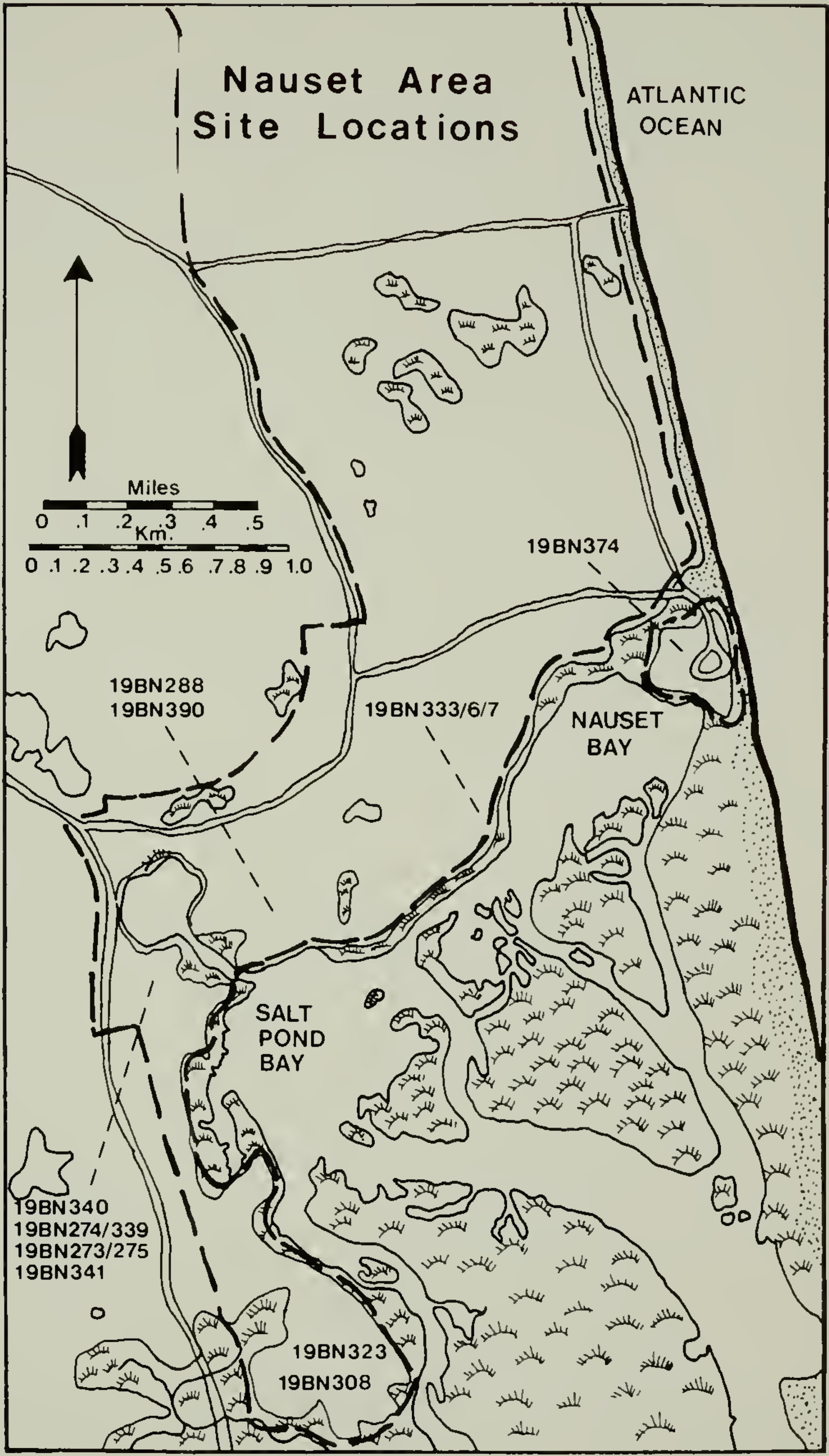
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19BN390
19BN333/6/7
NAUSET
BAY
SALT
POND
BAY
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19BN274/339
19BN273/275
19BN341
19BN323
19BN308

FOLDOUT B

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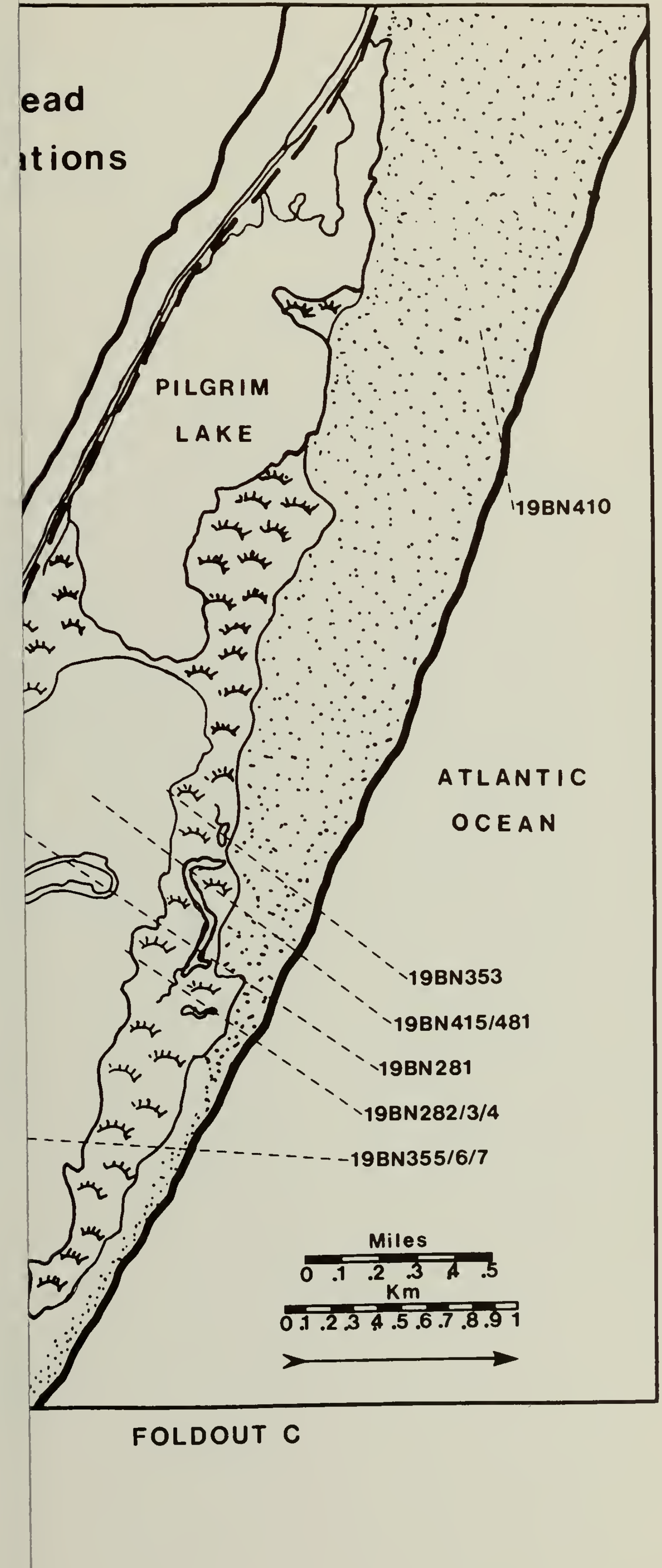
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LAKE
19BN410
ATLANTIC
OCEAN
19BN353
19BN415/481
19BN281
19BN282/3/4
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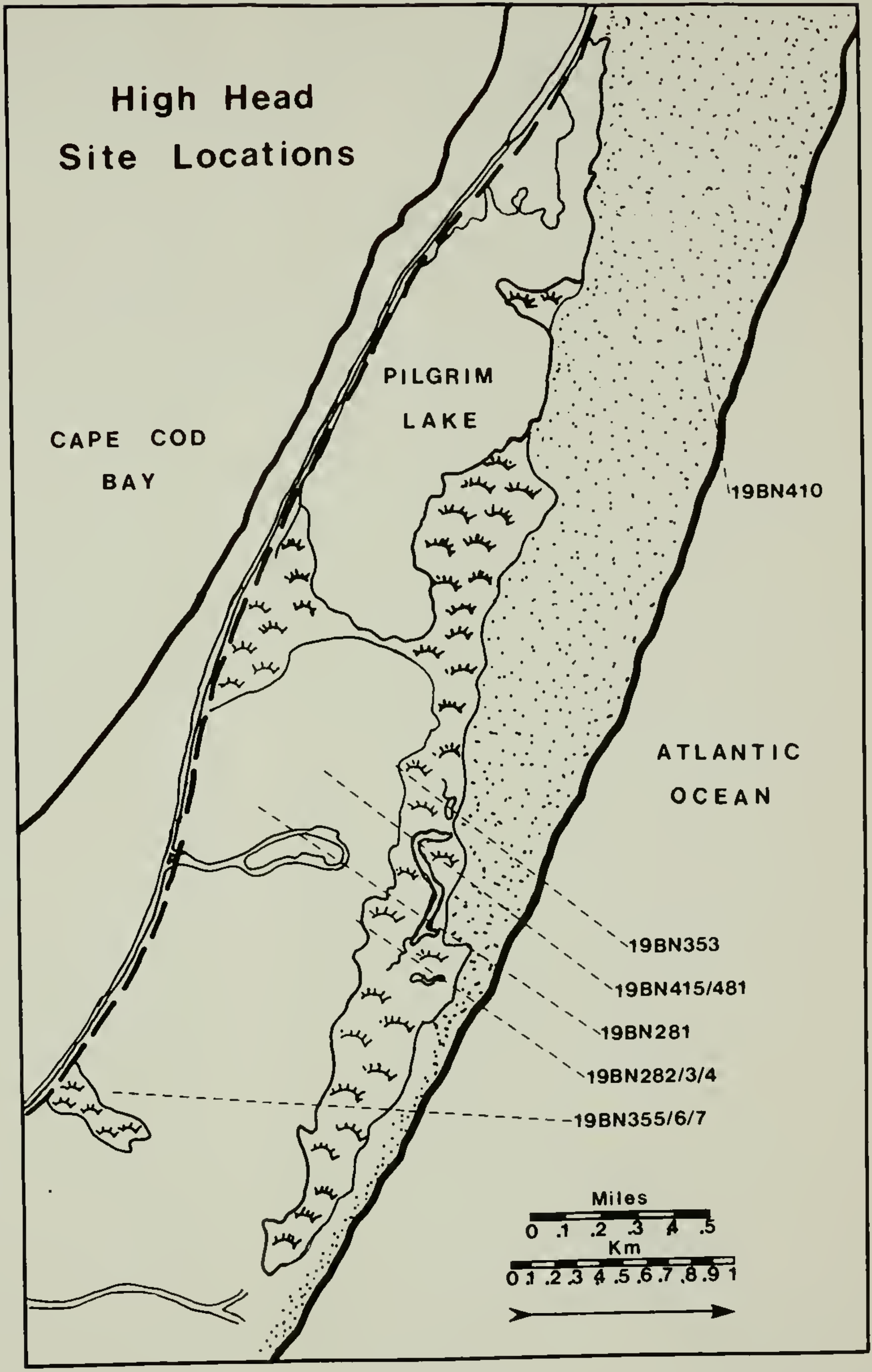
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Site Locations
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CAPE COD BAY
ATLANTIC OCEAN
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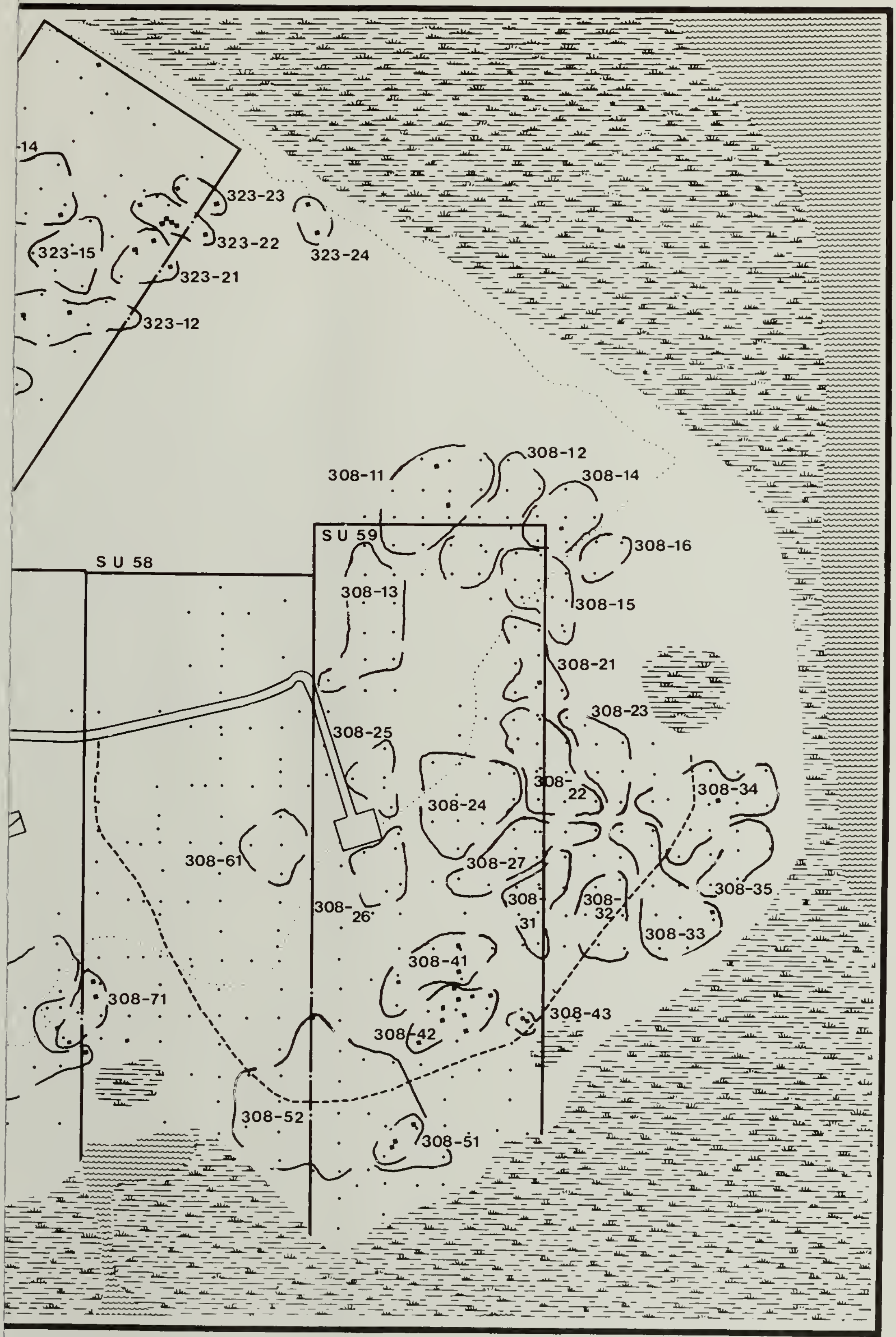
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SU 58
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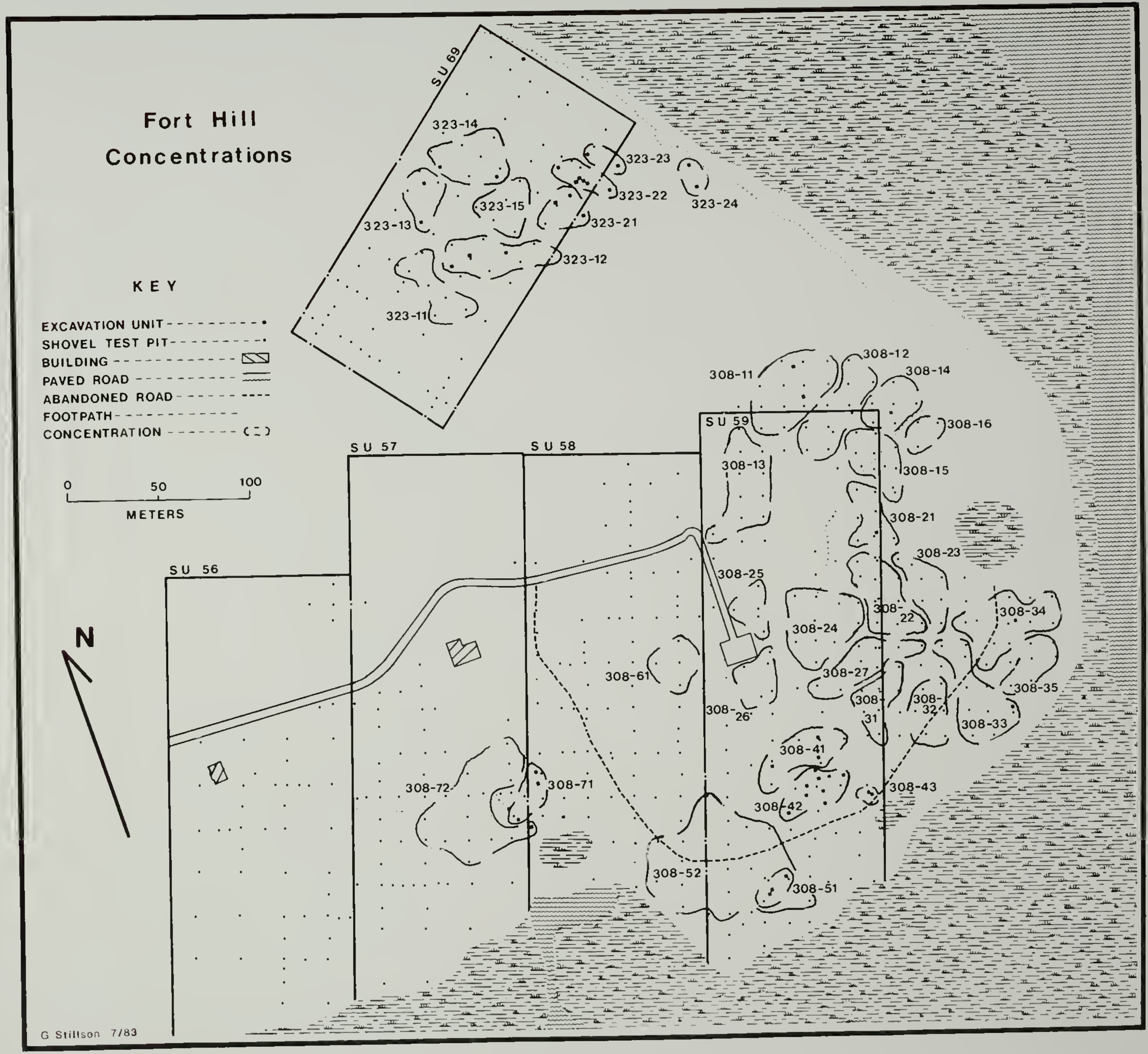
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SHOVEL TEST PIT
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ABANDONED ROAD
FOOTPATH
CONCENTRATION
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100
METERS
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SU 69
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323-23
323-22
323-24
323-15
323-21
323-13
323-12
323-11
SU 56
SU 57
SU 58
SU 59
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G Stillson 7/83

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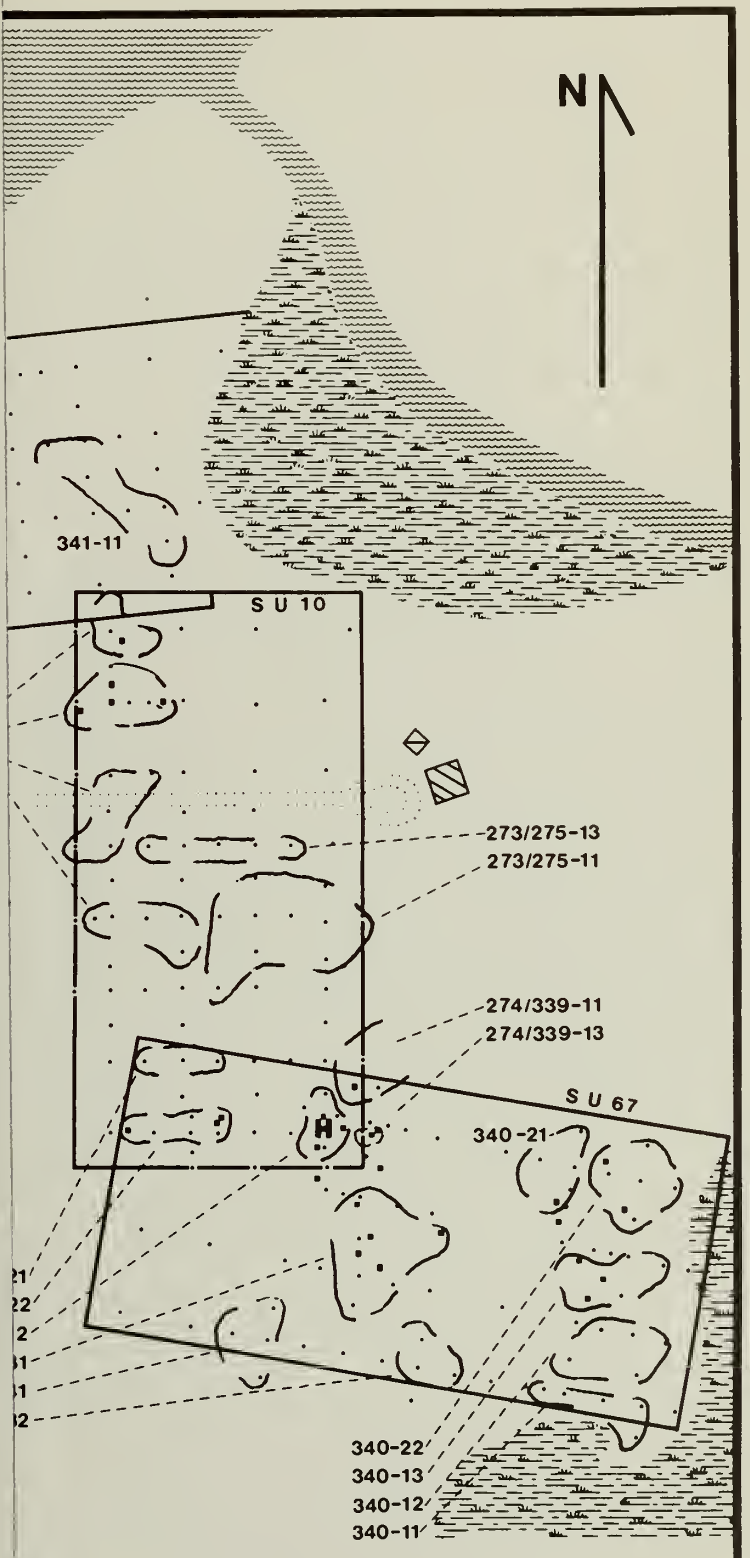
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S U 10
273/275-13
273/275-11
274/339-11
274/339-13
S U 67
340-21
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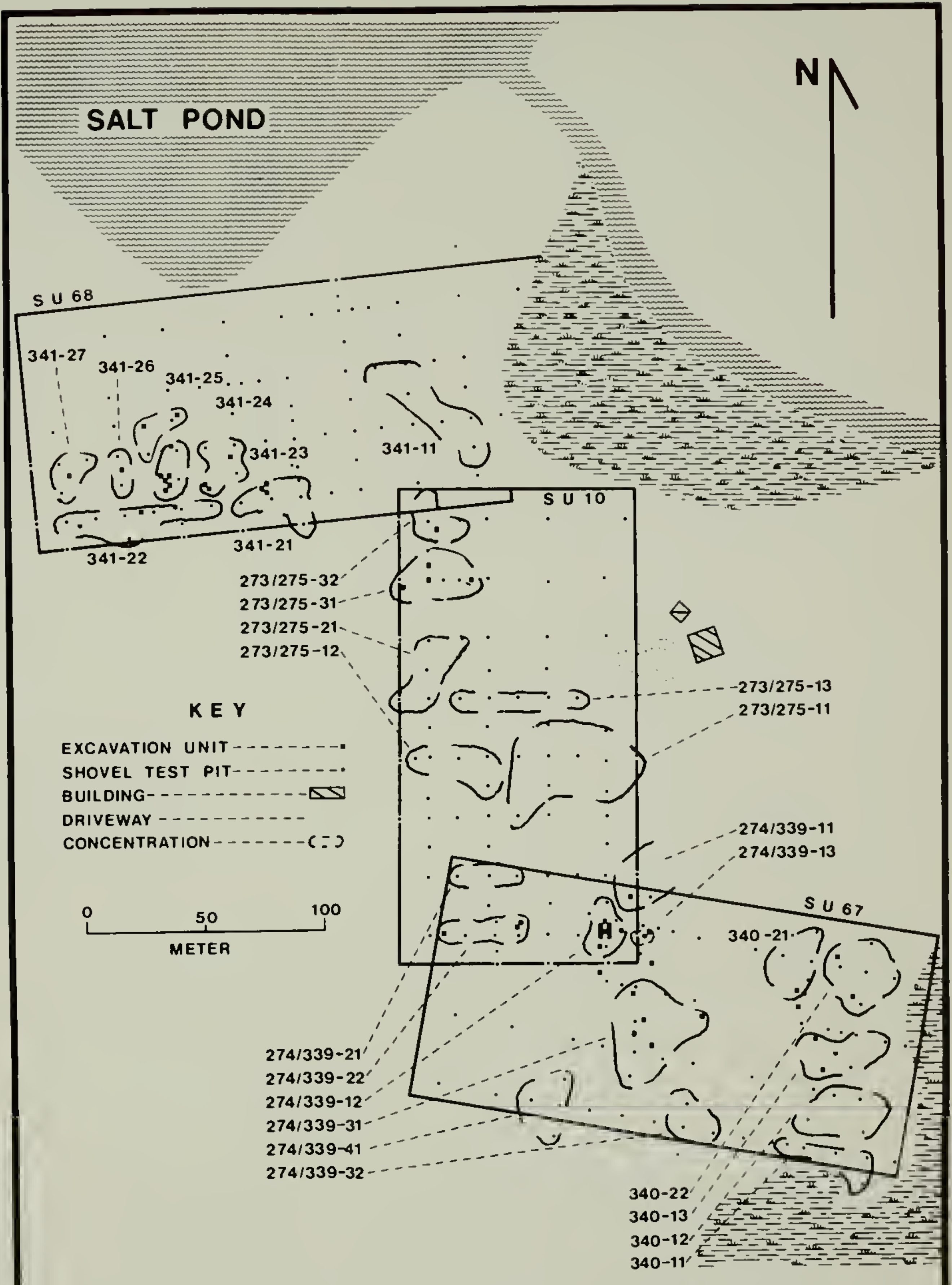
1
32
340-22
340-13
340-12
340-11

of Salt Pond Concentrations

G. Stillson 7/83

FOLDOUT E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273/275-31
273/275-21
273/275-12
273/275-13
273/275-11
KEY
EXCAVATION UNIT
SHOVEL TEST PIT
BUILDING
DRIVEWAY
CONCENTRATION
0
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METER
274/339-11
274/339-13
SU 67
340-21
274/339-21
274/339-22
274/339-12
274/339-31
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340-13
340-12
340-11

Southern Side of Salt Pond Concentrations

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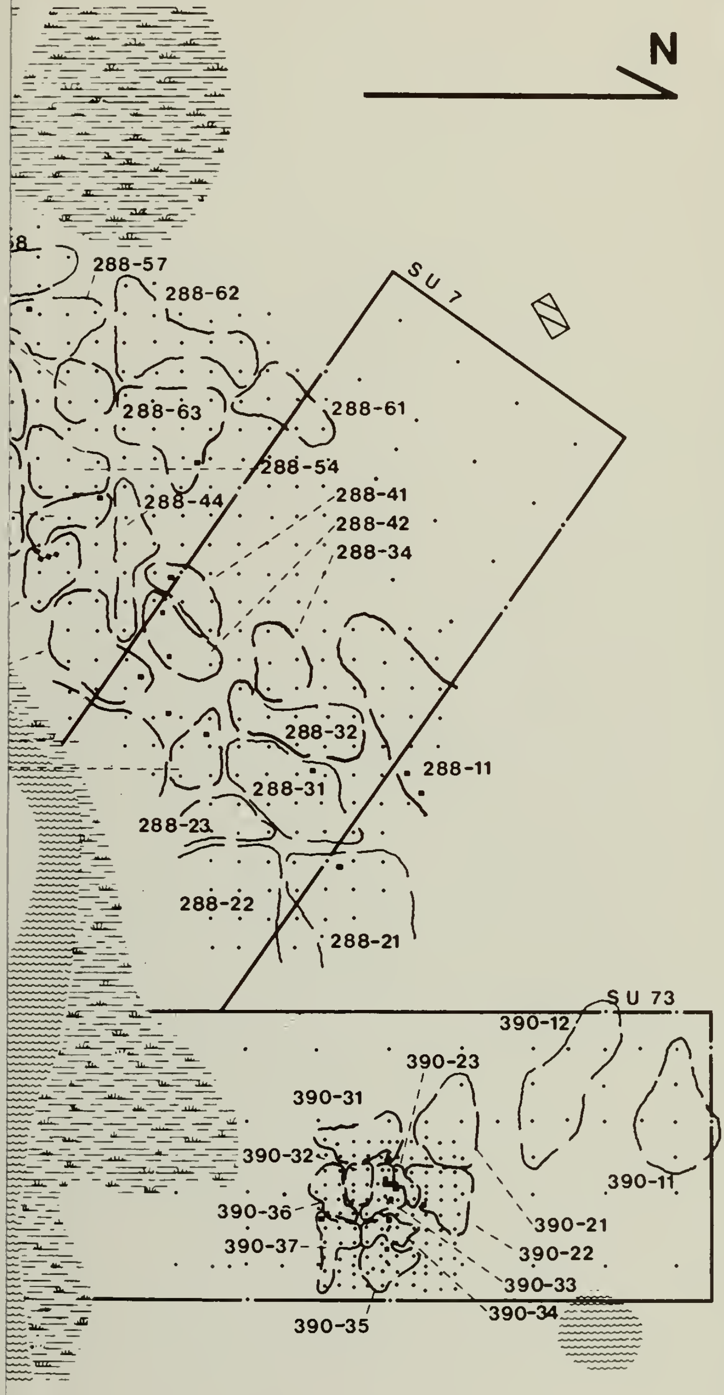
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SU 73
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390-31
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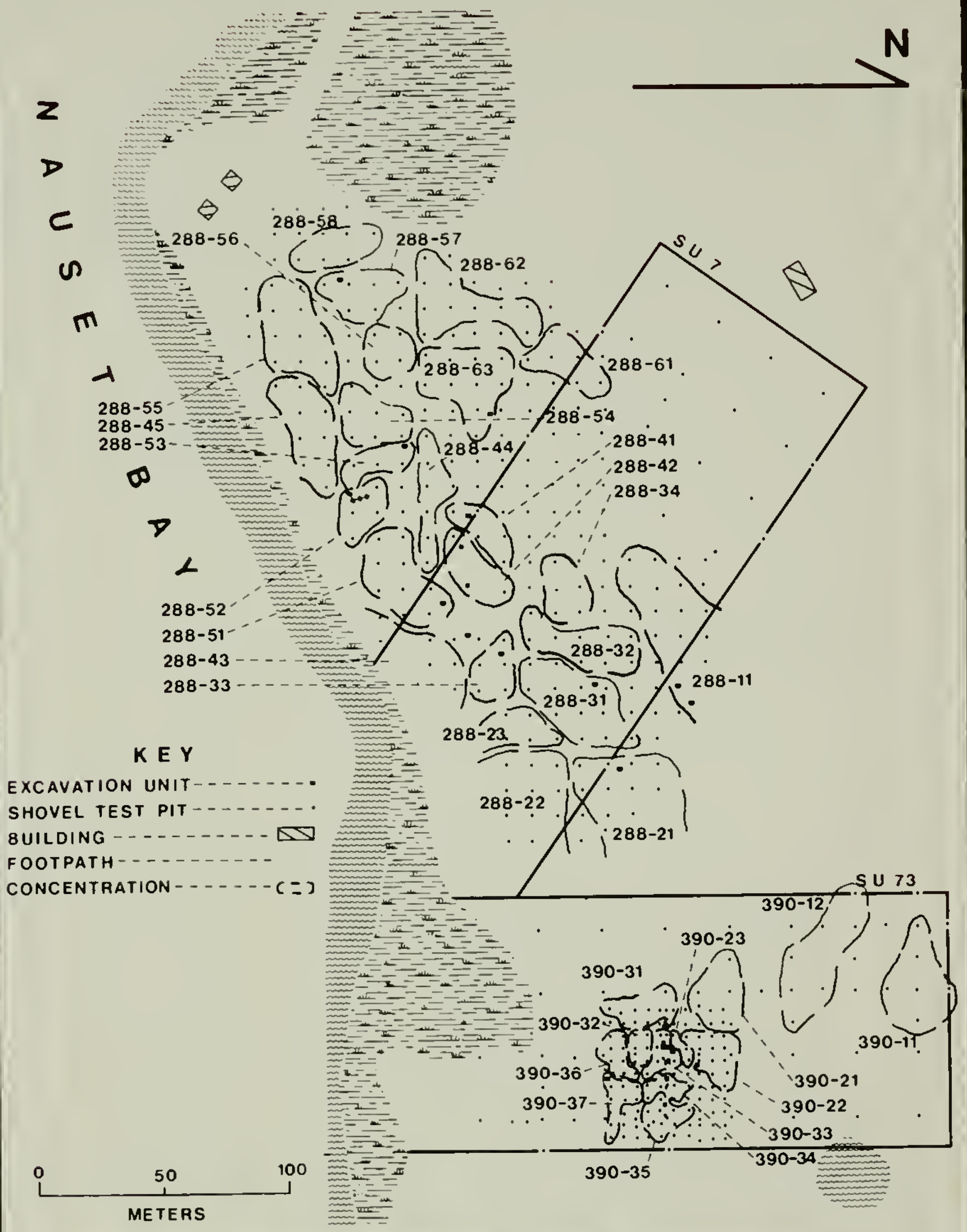
of Salt Pond Concentrations

G Stillson 7/83

FOLDOUT F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390-35
KEY
EXCAVATION UNIT
SHOVEL TEST PIT
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FOOTPATH
CONCENTRATION
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Northern Side of Salt Pond Concentrations

G Stillson 7/83

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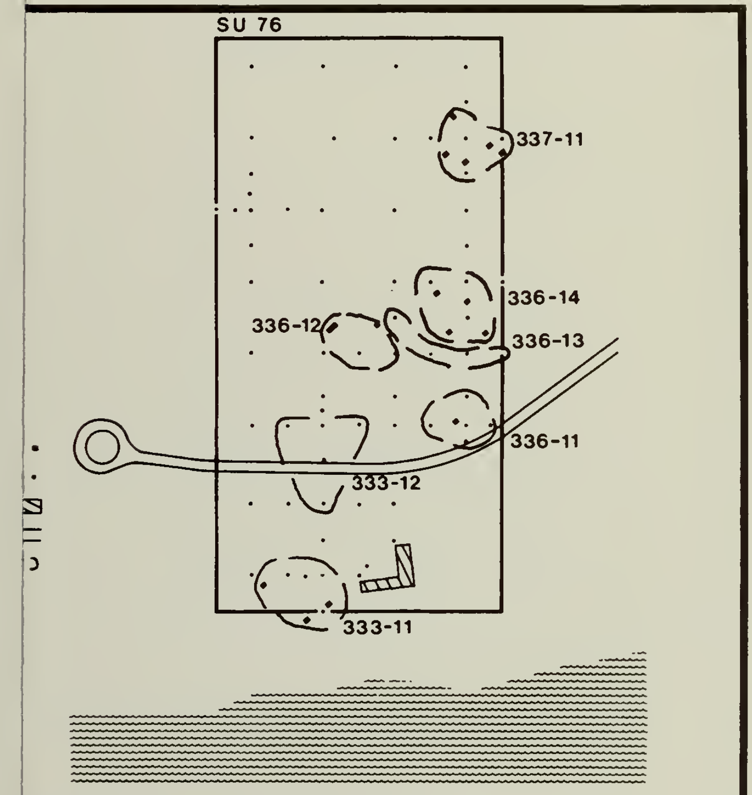
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333-11

6\7 Concentrations

G Stillson 7/83

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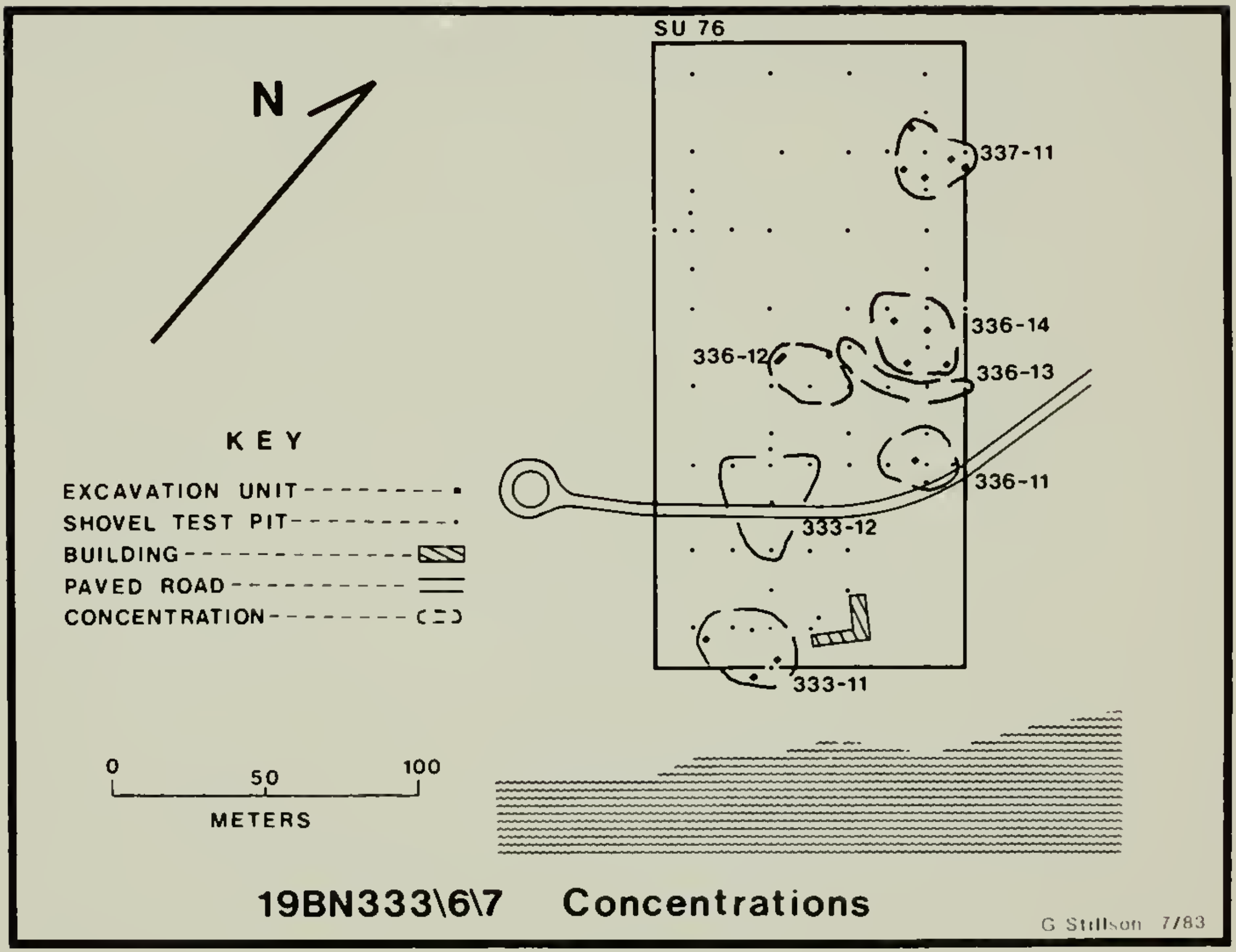
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G Stillson 7/83

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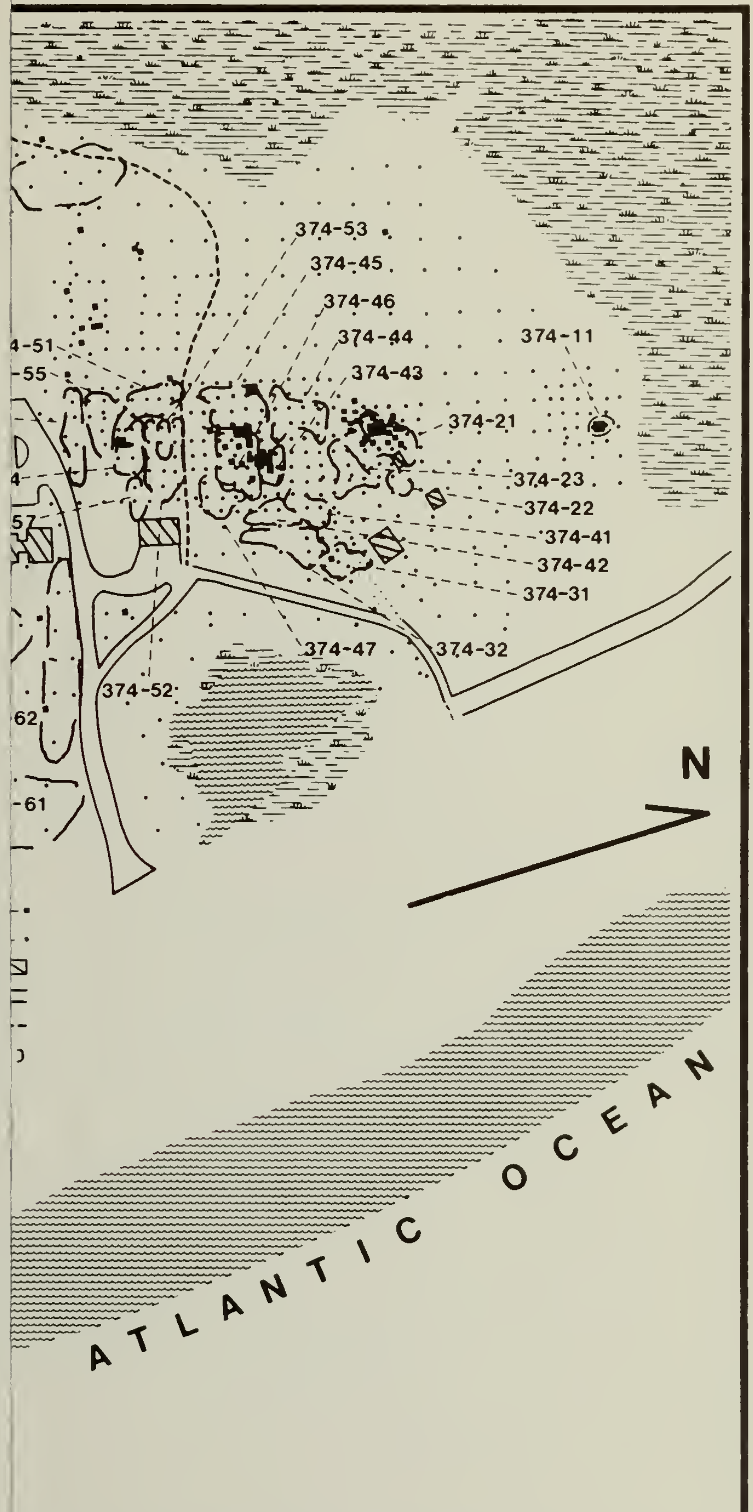
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ATLANTIC OCEAN

each (19BN374) Concentrations

G Stillson 7/83

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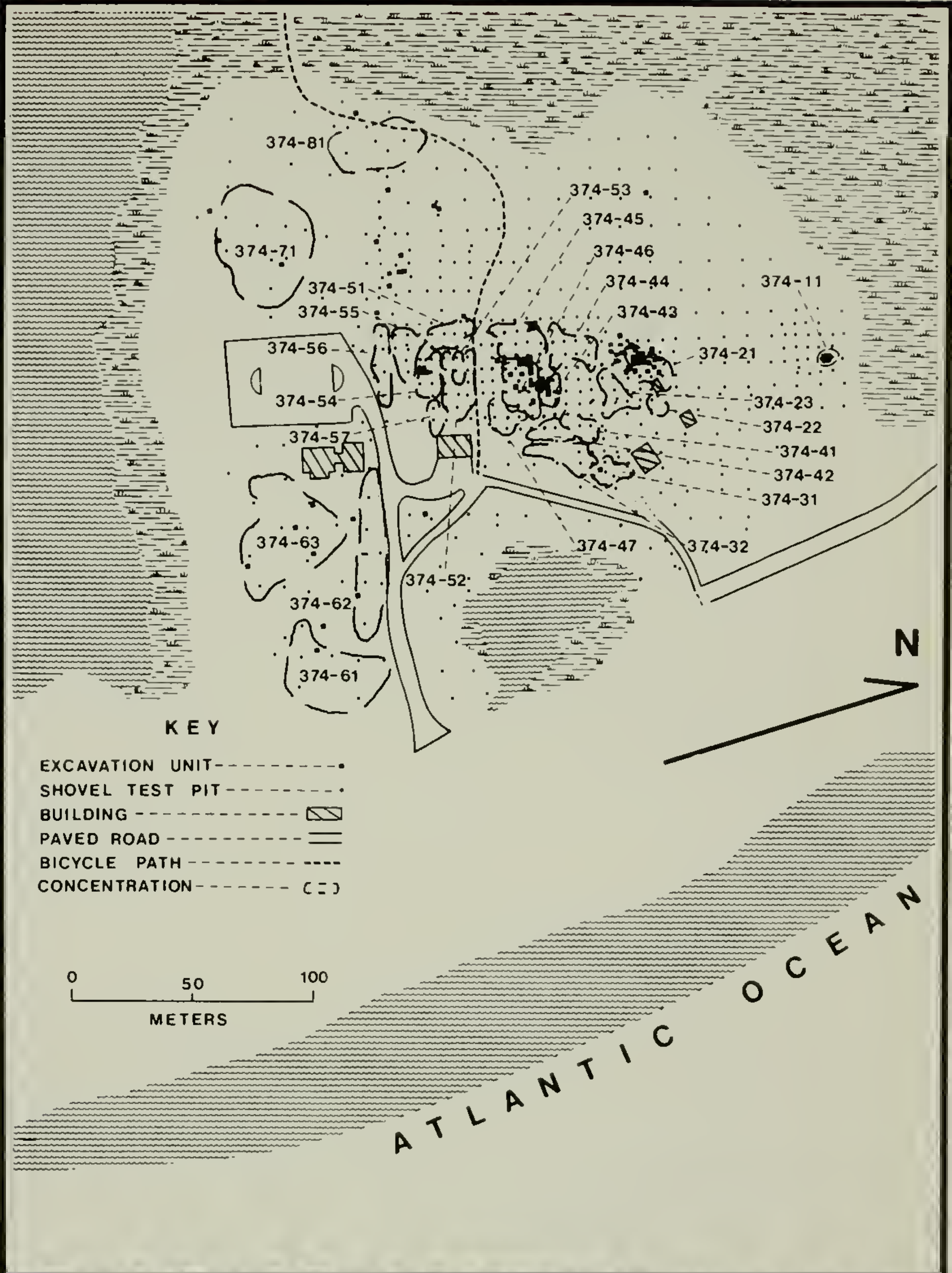
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KEY
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SHOVEL TEST PIT
BUILDING
PAVED ROAD
BICYCLE PATH
CONCENTRATION
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ATLANTIC OCEAN

Coast Guard Beach (19BN374) Concentrations

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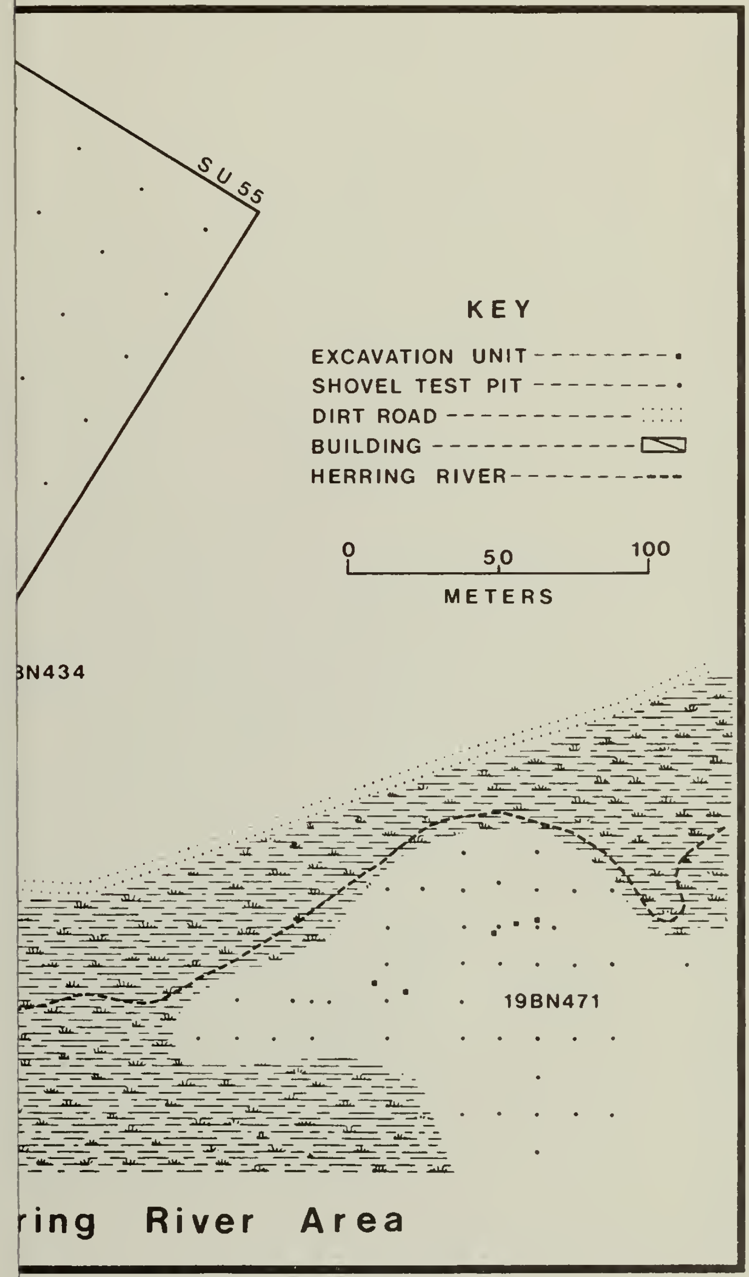
FOLDOUT H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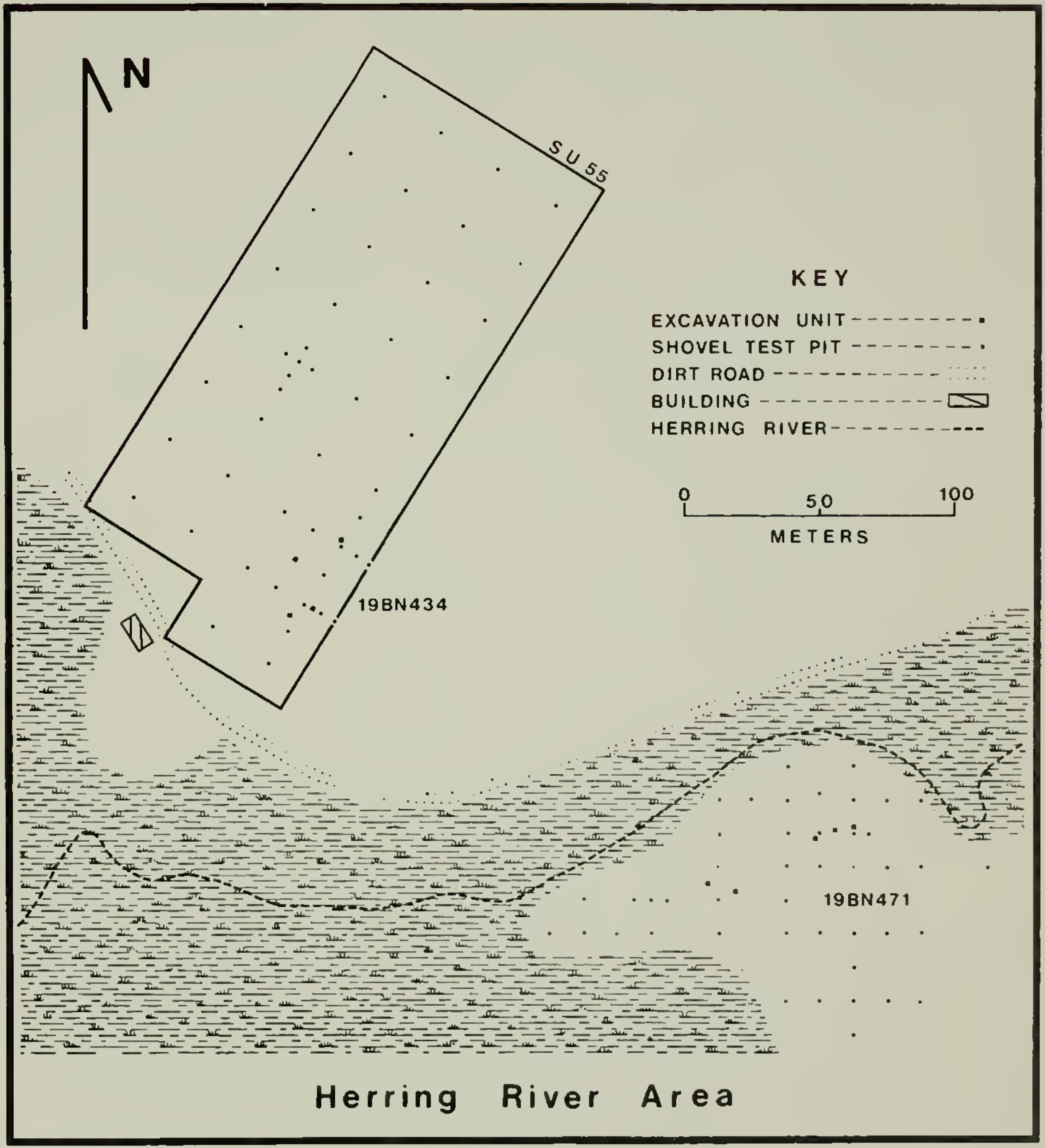
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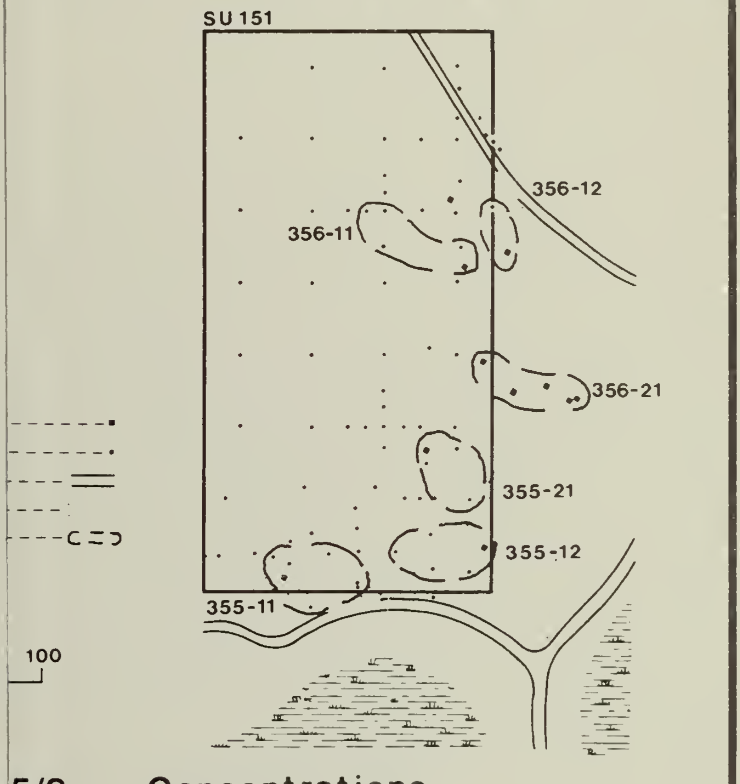
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5/6 Concentrations

G Stillson 7/83

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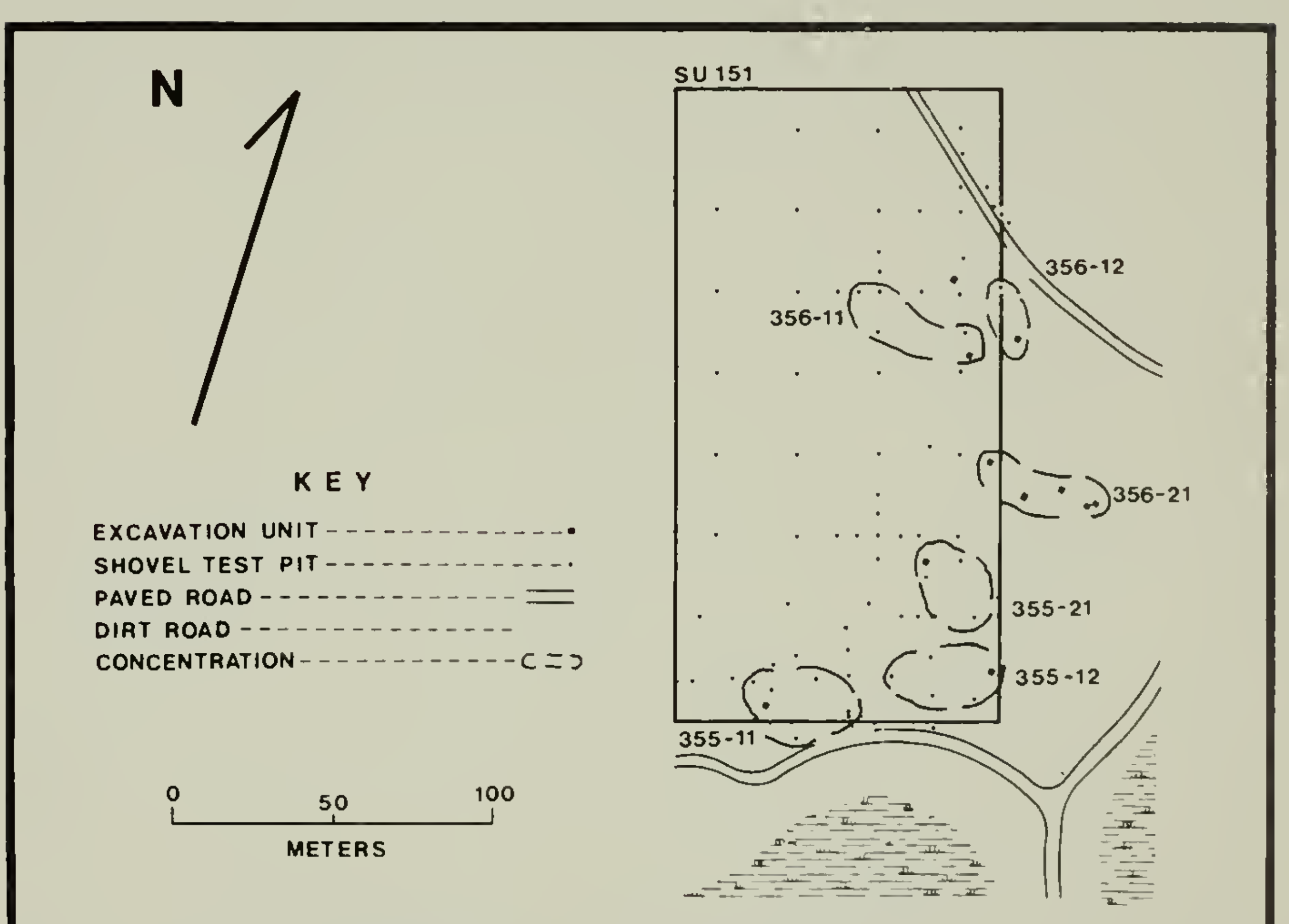
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KEY
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DIRT ROAD
CONCENTRATION
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19 BN 355/6 Concentrations

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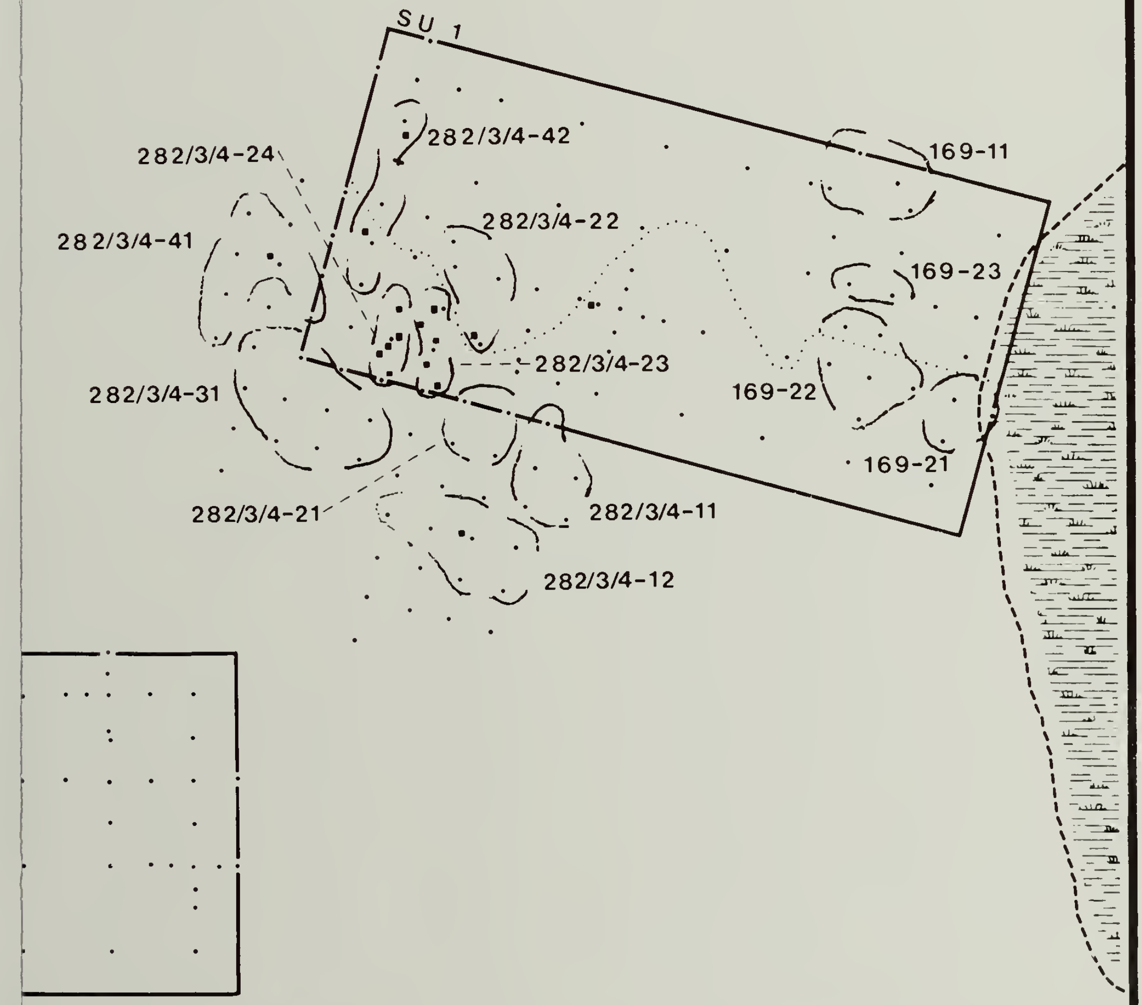
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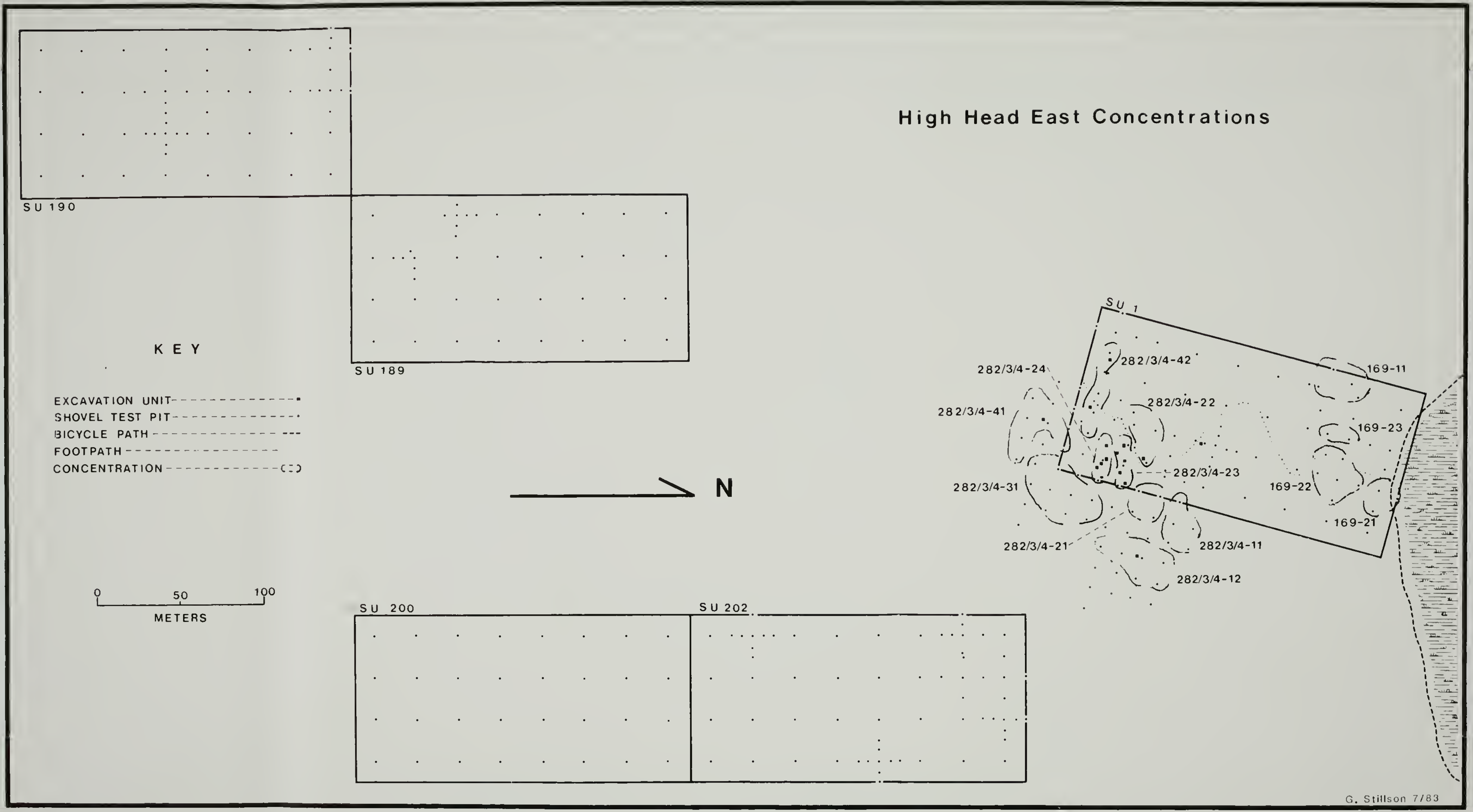
G. Stillson 7/83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SU 200
SU 202
SU 1
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G. Stillson 7/83

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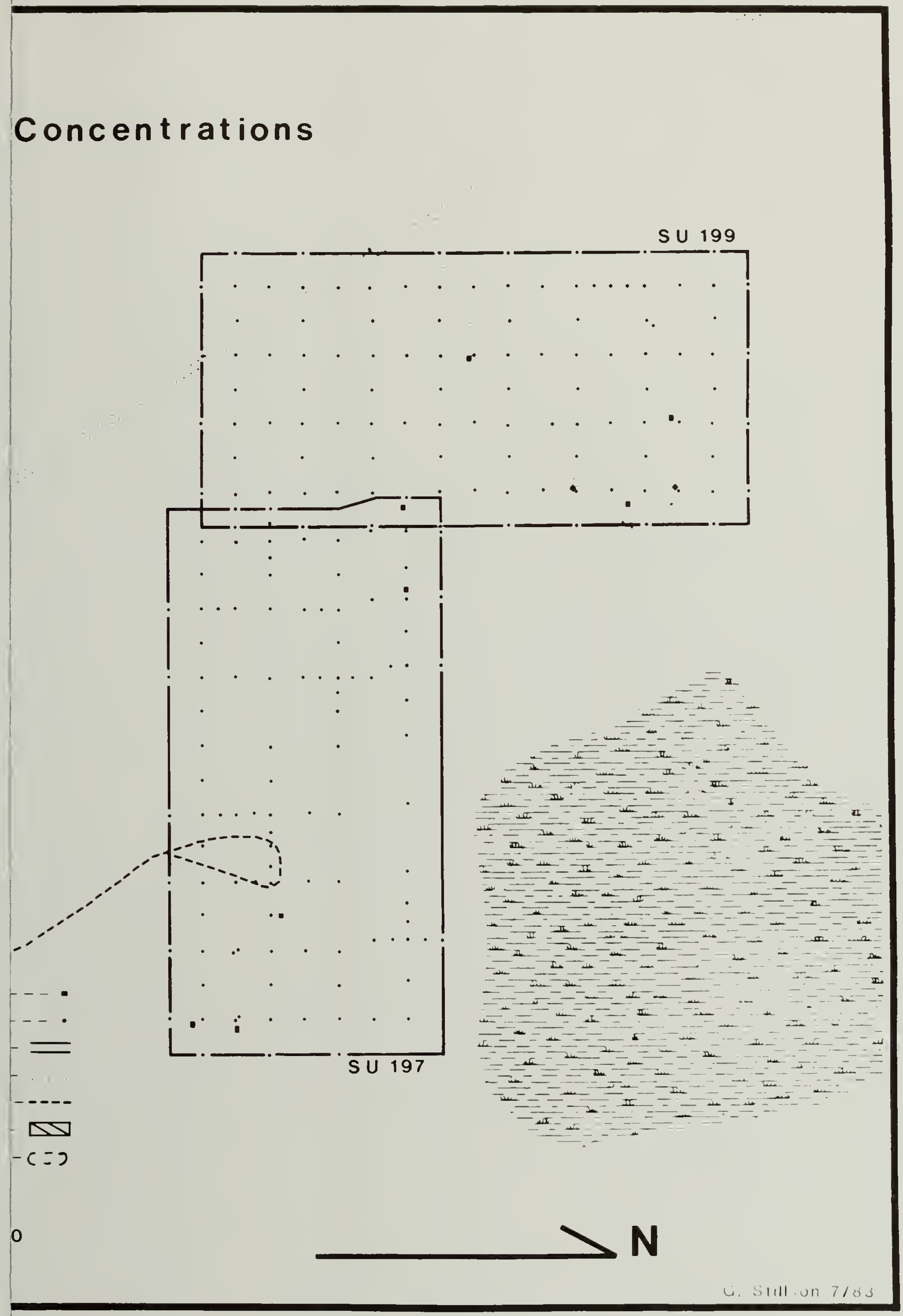
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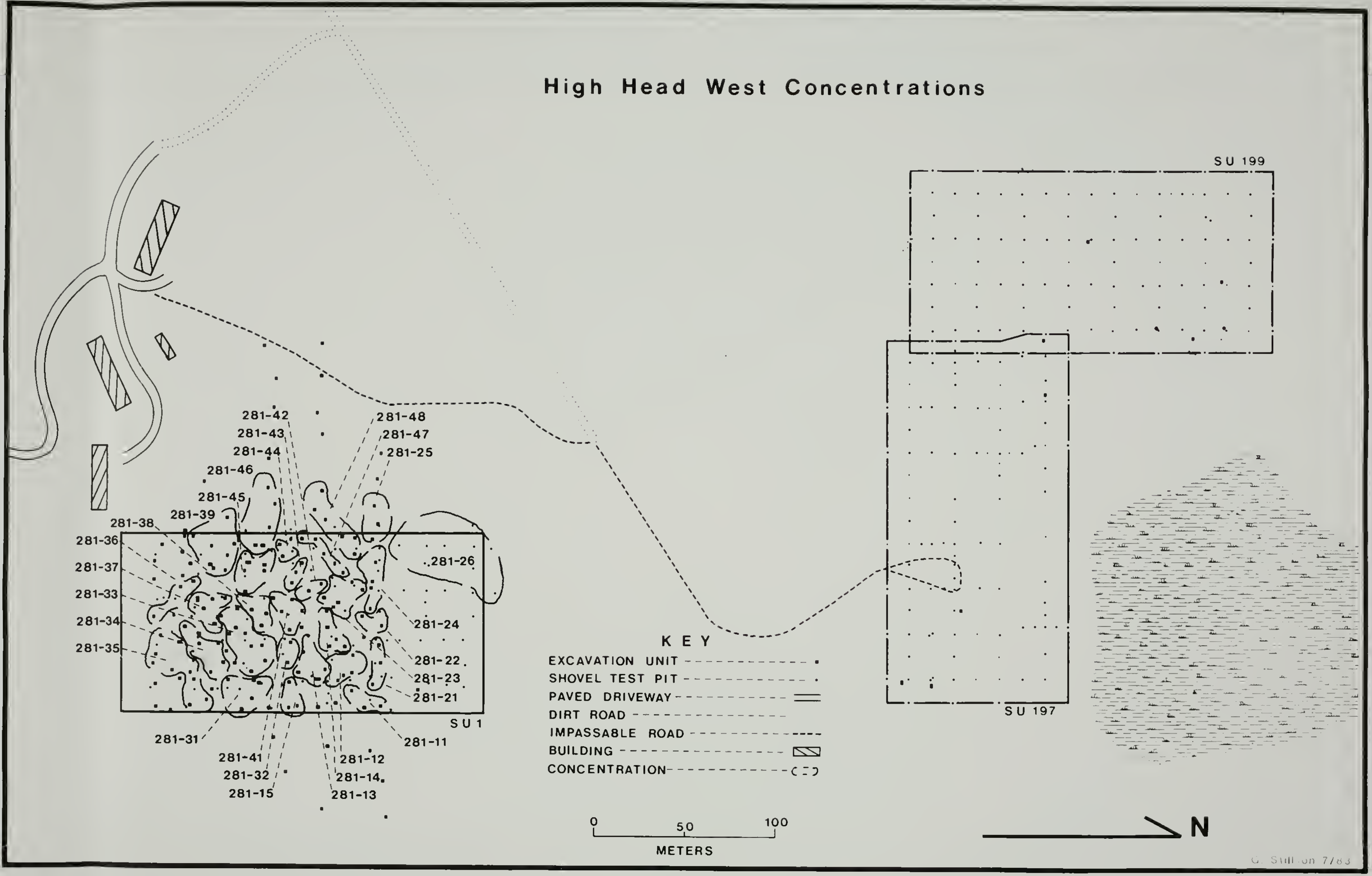
G. Stillson 7/83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281-13
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SHOVEL TEST PIT
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IMPASSABLE ROAD
BUILDING
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METERS
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C. Stillson 7/83

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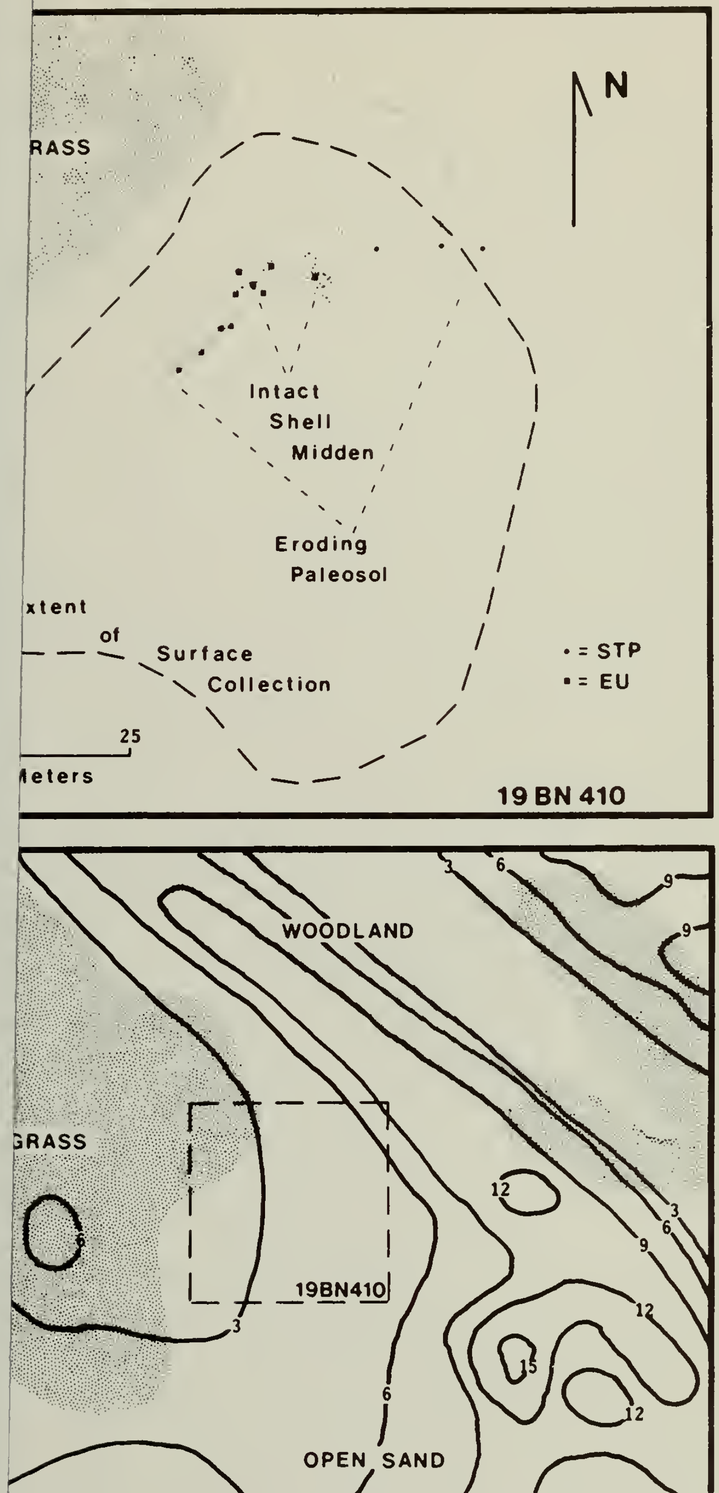
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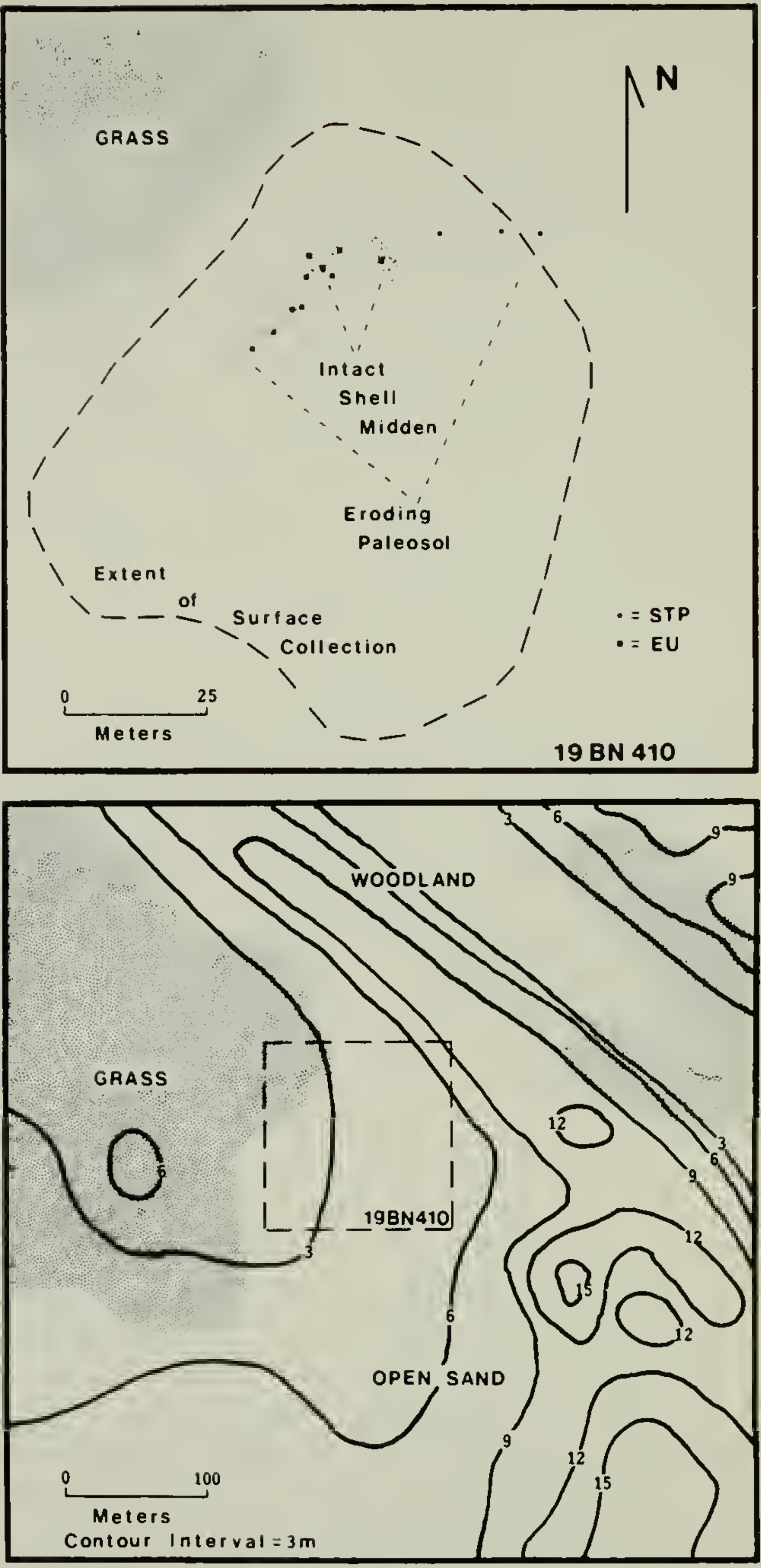
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REPORTS OF THE DIVISION OF CULTURAL RESOURCES
North Atlantic Regional Office, National Park Service

The Division produces and prints reports on archeological, curatorial, historical, and historic architectural topics that identify, evaluate, document, and interpret cultural resources in National Park Service units of the North Atlantic Region. Some of these reports are of general interest for their presentations of substantive, bibliographic, technical, or methodological information. These are listed below. Those that are listed with an NTIS number are only available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151. Others are available from the Division of Cultural Resources, NARO, National Park Service, 15 State Street, Boston, MA 02109. Prices are listed.

Cultural Resources Management Studies

No. 1	Archeological Resource Study, Roger Williams National Monument. Public Archaeology Laboratory, Brown University, 1979.	NTIS PB81 185134	
No. 2	Archeological Overview and Evaluation at Minute Man National Historical Park. Vernon G. Baker, 1980	NTIS PB81 185142	
No. 3	Historic Resources Study, Jamaica Bay: A History. Gateway National Recreation Area, New York-New Jersey. Frederick R. Black, 1981.	$4.00	
No. 4	Archeological Site Examination: A Case Study in Urban Archeology. Roger Williams National Monument. Patricia E. Rubertone and Joan Gallagher, 1981.	6.00	
No. 5	Archeological Resource Study, Historical Archeology at Bunker Hill Monument. Boston National Historical Park. Thomas Mahlstedt, 1981.	NTIS PB83 186957	
No. 6	Archeological Investigation at the Narbonne House. Salem Maritime National Historic Site. Geoffrey P. Moran, Edward F. Zimmer, Anne E. Yentsch, 1982.	7.00	
No. 7	Historic Resource Study, A History of Fort Wadsworth, New York Harbor. Frederick R. Black, 1983.	4.00	
No. 8	Chapters in the Archeology of Cape Cod, I. Results of the Cape Cod National Seashore Archeological Survey, 1979-1981 (2 volumes). Francis P. McManamon, editor, 1984.	7.50 9.00 15.00	Volume 1 Volume 2 Both Volumes
No. 9	The National Park Service in the Northeast: A Cultural Resource Management Bibliography. Dwight Pitcaithley, 1984.	7.00	

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Archeological Collections Management Project Series

No. 1	Archeological Collections Management at Salem Maritime National Historic Site. Alan T. Synenki and Sheila Charles, 1983.	$4.00
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Other Publications

Cultural Resources Inventory, Lowell National Historical Park and Preservation District: Report. Shepley, Bulfinch, Richardson and Abbott, Architects, 1980.	NTIS PB81 189169
The Archeology of Cape Cod National Seashore. Francis P. McManamon and Christopher L. Borstel, 1982. (pamphlet 16 pp.)	1.00